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FACTORY

JULY 1952

MANAGEMENT AND MAINTENANCE

WORK SAMPLING — new way to get all the facts you need — to cut costs

PAGE 83

PLUS 19 MORE ARTICLES AND 18 REGULAR DEPARTMENTS • COMPLETE CONTENTS, PAGE 2

Remington Rand Methods News

HOW "FACT-POWER" CAN BOOST YOUR PLANT'S OPERATING EFFICIENCY

Personnel work can be simplified NOW

Employee relations are bound to suffer if your personnel people have their hands tied by clumsy paperwork. Let us show you how other plants expand and contract the working force as needed, without upsets or waste of talent. How specific skills and experience can be quickly located within your organization. How 80% of all phone inquiries to personnel department can be answered in seconds. How control can be maintained over punctuality, vacations, service pin awards, etc. How a complete *visible* picture of each employee can aid you in merit rating and counseling.

These and other profitable procedures are shown in our manual of personnel administration **X-521**; an easy way for you to change over NOW to more efficient records is shown in folder **BSD-2**.

The costly way to learn this lesson

Did you hear about the plant fire in which loss on building and contents was only $27,000, but the loss on plant records ran to more than $50,000? It turned out that the standard fire policy did not cover their cost of reconstructing the lost or damaged inventory cards and engineering drawings.

The moral for management is plain: Don't depend on insurance alone for promptly resuming operations after the firemen leave. It pays to provide *insulated* protection for vital operating records at point-of-use.

We will be glad to help you determine exactly the protection your records need, considering building construction and existing hazards. Ask for our useful booklet on the cost of burned records, **SC-707.**

Saves engineering time and talent: Here's how anyone can quickly make photographic "tracings" and copies from pencil drawings, blueprints, vendor specifications, etc. Old drawings can be restored; new ones can be saved from smudging or wear and tear. Details can be revised without retracing and checking the entire drawing. See how many other ways you can profit from the *versatile* Portagraph contact printer (in wide range of sizes). Ask for new folder **P-305.**

Where do you start in production control?

High set-up costs may stem from poor materials control

"Hot lists" and costly emergency machine set-ups can often be traced back to rule-of-thumb requisitioning of raw materials and parts. If your production control should *begin* with the materials, we offer you a new cost-cutting approach to the problem of dependable supplies and smooth-flowing output.

The right methods: This new system is more efficient because it combines TWO familiar methods, employing each where it will do you the most good.

First, the Remington Rand punched-card method "explodes" your bills of materials with speed and accuracy. This is your most efficient way to compute and report total requirements, by week or month, for each raw material, each purchased or manufactured part, etc. You'll be surprised at how simply this method can handle job orders, as well as variations in model on production runs.

Second, the Kardex visible method gives you effective *control* of the supply for each material and part. It graphically charts your current condition on each item. Just a glance shows you where expediting is needed. This is your most efficient way to assemble all the essential facts on procurement, receipts, allotments and disbursements by item.

Tailor-made: This system can be profitably adapted to your special needs—large plant or small. And Remington Rand will take full responsibility for the *complete* system: all the forms, equipment and services you need. Let us show you how it works; read our manual on production control **X-1268.** Get more details by asking to see our folder **MC-767.** And see in folder **BSD-6** how we can even tabulate your requirement lists from your own bills of materials.

Time-saver coupon brings information. SEND IT TODAY!

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RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Dangerous acid travels safely in rubber train

A typical example of B. F. Goodrich improvement in rubber

INDUSTRY needs a lot of acid. Workmen used to lug it from place to place in big glass bottles. But accidents did happen. Bottles would slip, crash, spatter acid in every direction. With 20% breakage each year, it was expensive replacing the wasted acid, but even harder on the workmen.

A steel company in the east knew that rubber linings were used in tank cars that carried acid. They wondered if the same thing on a smaller scale — a miniature railroad — could solve their problem.

What had made the acid-carrying tank car possible was a development made years ago by B. F. Goodrich. BFG engineers had found a way to attach rubber to steel, to make a leakproof tank able to hold many of the most corrosive acids.

B. F. Goodrich rubber lined the two miniature tank cars you see in the picture. That was 14 years ago. Ever since, this rubber railroad has been scooting around the sprawling steel mill, delivering acid wherever it's needed. Gone forever is the costly breakage, loss of acid, danger to workmen.

This is typical of B. F. Goodrich research which is constantly at work to develop new products and improve applications of older ones. That's why — no matter what rubber products you use — it pays to check regularly with your BFG distributor, to make certain you get all the latest improvements and savings. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER FOR INDUSTRY

FACTORY
MANAGEMENT AND MAINTENANCE

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FOR 61 YEARS

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84 **HOW WOULD YOU LIKE TO KNOW** how your indirect labor's time is spent? Are you wasting maintenance man-hours because of poor planning and methods? How much does materials handling really cost you? "Work sampling" may give you the answers.

90 **WHAT, NO MAJOR LAY-OFFS IN TWO YEARS?** Yes. That's the record at Hotpoint. And Hotpoint gives much of the credit to "planned advancement." Four out of five job openings have been filled by employees who have qualified under this program.

96 **IF YOU HAVE MAINTENANCE TROUBLES**—cost and control—this simple work-measurement plan may be what your doctor ordered. Past performance is certainly a better yardstick than no yardstick at all.

99 **WITH JUST TWO FORMS, A CHART AND A GRAPH,** it's easy to keep maintenance efficiency at a high level. The plan was built for a maintenance section of several hundred craftsmen, but it can be tailored to any small plant's maintenance needs.

106 **MEANS FEWER GRIEVANCES,** says Tapco. Any plan that does that ought to rate a few minutes of every plant man's reading time.

108 **GOOD MAINTENANCE ALONE WON'T GUARANTEE LONG BELT LIFE.** You've got to start off with the right belt, install it right, and use it right. Here are a lot of do's and don't's that will help you get extra years of wear.

114 **EVERY DAY'S THE DAY** to square off for a new look at your handling. Take today's look with this Sylvania checklist in hand.

126 **HOW DO YOUR PAY SCALES FOR INDIRECT LABOR** stack up against other manufacturing plants in your area? In the rest of the country? In December FACTORY gave you the dope on 11 cities. Here's the dope on 20 more.

133 **HERE ARE THE FIRST DETAILS** of G-M's "dual-purpose" plant now a-building in Arlington, Tex. How fast can it convert from peace to war production? How efficient is it? Who's footing the bill? You'll find the answers in this article.

COMING IN AUGUST

Do you ever get yawns instead of cheers when you make a speech? Do you consider it a problem to get up on your feet and and talk to a group? If so (and maybe even if you don't have these problems) you'll get plenty of help out of "How to Talk to Groups of People" in the August issue. This article is chock full of practical hints on how to do a better job of presenting your ideas in public. Written by the dean of all speech teachers, the one and only Dale Carnegie.

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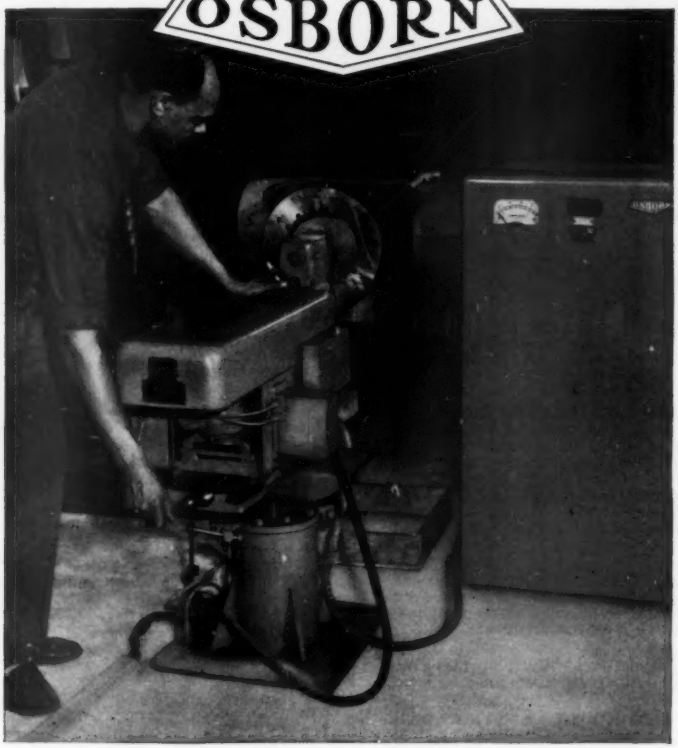
OSBORN



SET-UP IS SIMPLE. The machine is versatile. If your production involves small runs of many different types and sizes of gears and similar parts, you can specify machine settings for each part and operator can make set-up changes easily and quickly for maximum daily output. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing interval to suit the size, shape or condition of part being brushed.

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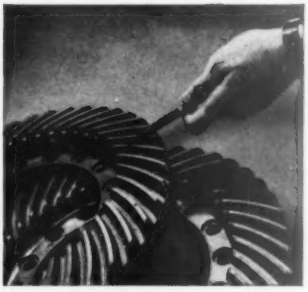

RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear tooth has smooth, uniform rounded edges. Surfaces are blended.

Osborn Brushes

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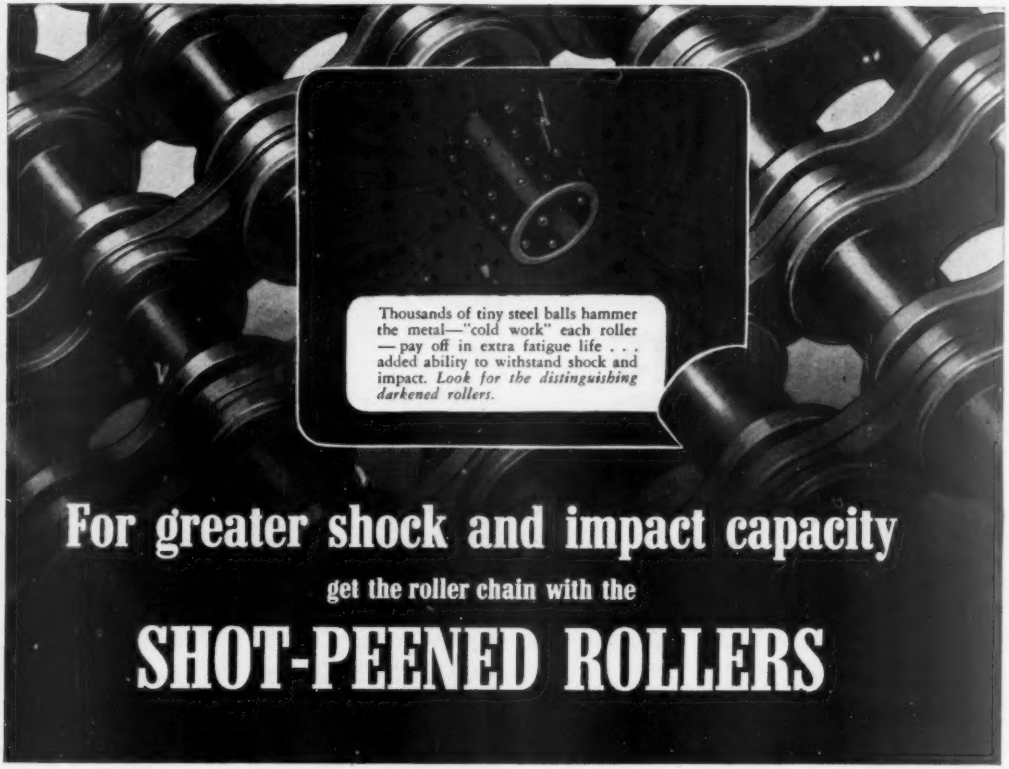
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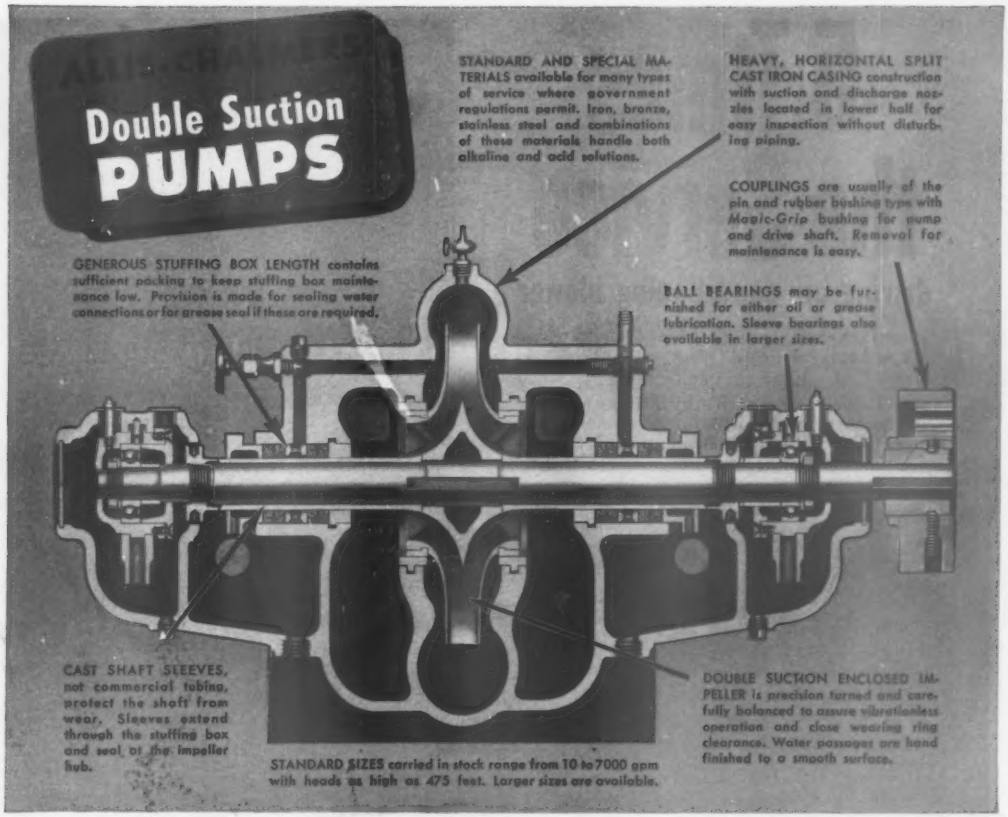
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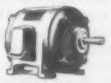

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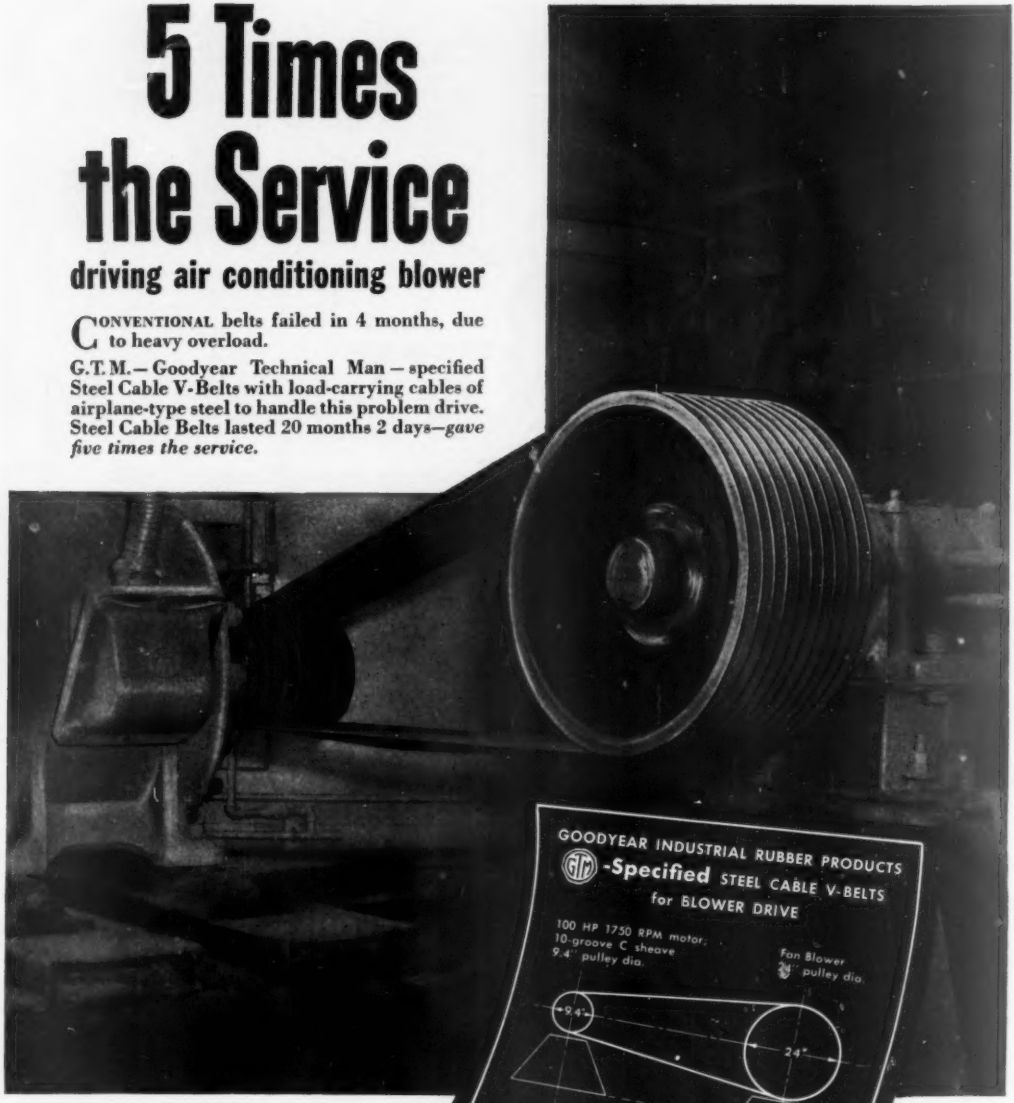

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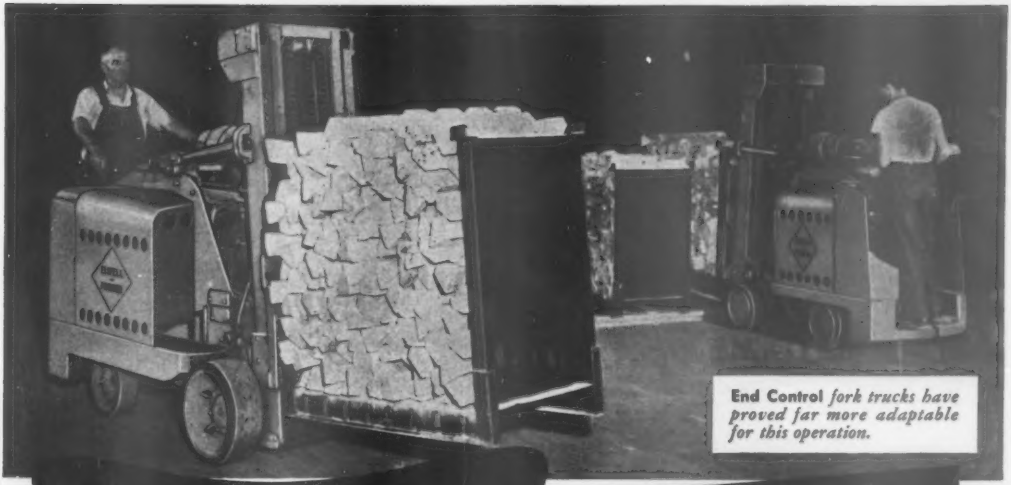


End Control *fork trucks have proved far more adaptable for this operation.*

10 Times Less Labor

WITH

ELWELL-PARKER TRUCKS

—in production of vital defense metal

"More Magnesium for Jet Aircraft and Guided Missiles!" To meet that urgent need, a prominent magnesium company has accelerated production at its 29-acre plant. Elwell-Parker electric fork trucks play a major role in this all-out job.

Ingots stream steadily from the smelting and pouring departments to a large central depot. Because of their light weight, the ingots are readily assembled into master unit loads on special steel skids. Agile Elwell-Parkers then pick up the loads as fast as formed and express them to storage or directly into freight cars.

The three E-P trucks can handle more tonnage in less time than could 30 men with hand trucks.

On critical defense operation such as this, the famed dependability of Elwell-Parker trucks really pays off. Built-in quality insures 15 to 20 years of *steady* truck service. Easy accessibility of all parts simplifies preventative maintenance that assures dependable and continuous performance. For advice about your specific needs, request Elwell-Parker's *Industrial Logistics Service.* Write The Elwell-Parker Electric Co., 4026 St. Clair Avenue, Cleveland 3, Ohio.

NEW CATALOG

describes the E-P line in detail. Send for your copy NOW.

ELWELL-PARKER

POWER INDUSTRIAL TRUCKS

Established 1893

Barkow, Milwaukee Crating and Boxing Specialist, Uses DELTA TOOLS in Packing Other Companies' Products

Everything from tiny repair parts to huge 40,000-lb. bottle-washing units comes to this thriving shop—overseas shipments or defense material to be crated to strict government specifications. Over 300,000 board-feet of lumber is used every month—all cut by Delta saws.

As a result of mass production efficiency and economies achieved in its own packing operations by means of Delta Tools, Barkow Manufacturing mushroomed its shipping department into a thriving specialty business, preparing shipments for neighboring companies—better, faster and cheaper than they can do it.

Barkow's Delta tools include four heavy-duty radial saws, two 10-inch circular saws, one 12-inch tilting arbor saw, a 14-inch band saw and a 17-inch floor-model drill press. All crating lumber is cross-cut to exact size on the radial saws, then fed to the table saws for accurate ripping. The band saw is used for special pieces to brace and support crates for delicate instruments and precision equipment.

Monthly consumption of lumber—over 300,000 board-feet—is enough for 20 five-room frame houses.

The "open secret" of Barkow's success is simply to carry through the sound basic principle of "the right tool for the right job" to its ultimate usefulness.

Why not find out how Delta tools can achieve mass production benefits in your packing and shipping operations? Ask your Delta dealer. He's listed in your classified telephone directory under "Tools".

There's a Delta Power Tool for Your Job- WOOD OR METAL WORKING

53 MACHINES • 246 MODELS • MORE THAN 1300 ACCESSORIES

Delta Tools Another Product

DELTA MILWAUKEE

DELTA POWER TOOL DIVISION

Rockwell MANUFACTURING COMPANY

628G East Vienna Avenue • Milwaukee 1, Wisconsin

Let the Figures Prove How Much More You Save With "Keyed-For-the-Job" Automatic Trucks

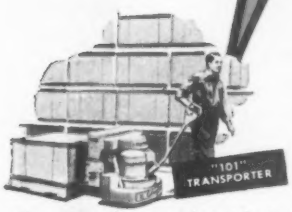
There's only one RIGHT truck for each material handling job . . . and Automatic has the experience and know how that saves you money with trucks "Keyed-For-the-Job"

BEFORE you buy *any* material handling truck, be sure it's "keyed-for-the-job" in your plant. A truck which is either too big, too small, or inadequate for efficiently handling *your* particular product, may not save you enough material handling money to pay its cost within a reasonable time. Or those savings may be delayed longer.

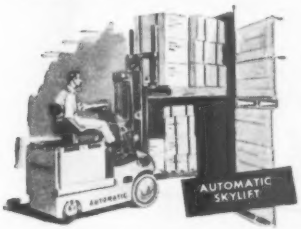
The way to be sure you get money-saving performance that lets you write off its investment quickly, is to take a look at how many *more* electric trucks Automatic has to offer . . . how many *more* ingenious devices it has to fit whatever "tough" handling problem you have.

From the smallest to the largest truck . . . from the lightest to the heaviest products to be moved, lifted or tiered, expect the *right* truck from Automatic . . . an electric truck *"keyed-for-your-job,"* and *your job alone!*

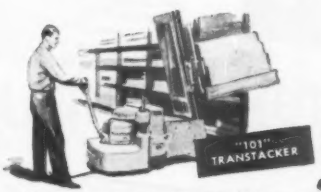
That is the secret of really cutting material handling costs. Put Automatic electric trucks to work in your plant, and let the figures prove that Automatic Trucks cost so little to operate, so little to maintain. Mail coupon for facts on Automatic "Keyed-for-the-job" electric trucks.



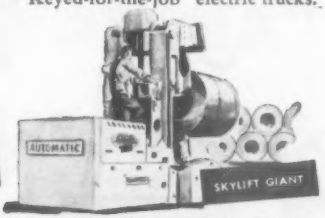
Moves tons of your product at the touch of a button . . . raise load to moving height in seconds . . . works all day for as little as pennies.



Lifts, moves and tiers material 132 inches from floor to top of fork. Drives and operates like an automobile—speeds up operation—reduces operator fatigue.



Ability to maneuver in crowded quarters makes this model ideal for operation in narrow aisles, and in areas where floor or elevator capacities are limited.



Designed for heavy duty handling requirements, the Skylift Giant is available in capacities ranging from 20,000 pounds to 80,000 pounds.

Automatic
ELECTRIC TRUCKS
Lighten LIFE'S LOADS

Trade Mark Registered

Automatic® 39 West 87th Street, Dept. K-2 Chicago 20, Illinois

Send me facts on Automatic "Keyed-for-the-Job" Electric Trucks.

☐ Have an Automatic representative call and give me a preliminary estimate of material handling savings using Automatics in my plant.

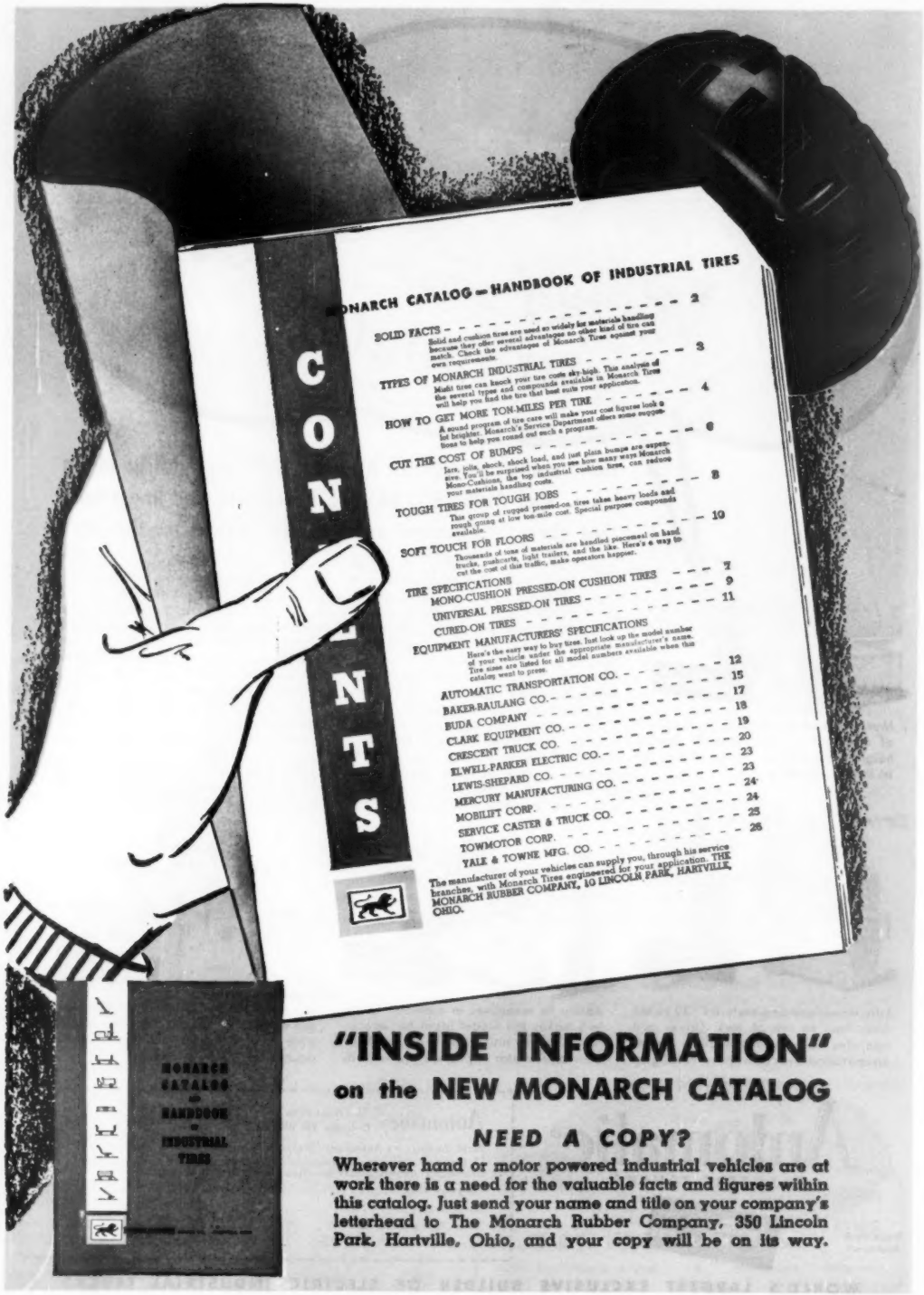
Company Name.....

By.....*Title*.....

Street Address.....

City.....*Zone*.....*State*.....

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC INDUSTRIAL TRUCKS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MONARCH CATALOG — HANDBOOK OF INDUSTRIAL TIRES
SOLID FACTS — 2
Solid and cushion tires are used so widely for materials handling because they offer several advantages no other kind of tire can match. Check the advantages of Monarch Tires against your own requirements.
TYPES OF MONARCH INDUSTRIAL TIRES — 3
Multi tires can knock your tire costs sky-high. The analysis of the several types and compounds available in Monarch Tires will help you find the tire that best suits your application.
HOW TO GET MORE TON-MILES PER TIRE — 4
A sound program of tire care will make your cost figures look a lot brighter. Monarch's Service Department offers some suggestions to help you round out each a program.
CUT THE COST OF BUMPS — 6
Jars, jolts, shock, shock load, and just plain bumps are expensive. You'll be surprised when you see how many ways Monarch Mono-Cushions, the top industrial cushion tires, can reduce your materials handling costs.
TOUGH TIRES FOR TOUGH JOBS — 8
The group of rugged pressed-on tires takes heavy loads and rough going at low ton-mile cost. Special purpose compounds available.
SOFT TOUCH FOR FLOORS — 10
Thousands of tons of materials are handled piecemeal on hand trucks, pushcarts, light trailers, and the like. Here's a way to cut the cost of this traffic, make operators happier.
TIRE SPECIFICATIONS
MONO-CUSHION PRESSED-ON TIRES — 7
UNIVERSAL PRESSED-ON TIRES — 9
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EQUIPMENT MANUFACTURERS' SPECIFICATIONS
Here's the easy way to buy tires. Just look up the model number of your vehicle under the appropriate manufacturer's name. Tire sizes are listed for all model numbers available when this catalog went to press.
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The manufacturer of your vehicles can supply you, through his service branches, with Monarch Tires engineered for your application. THE MONARCH RUBBER COMPANY, 10 LINCOLN PARK, HARTVILLE, OHIO.
MONARCH CATALOG AND HANDBOOK OF INDUSTRIAL TIRES

"INSIDE INFORMATION"

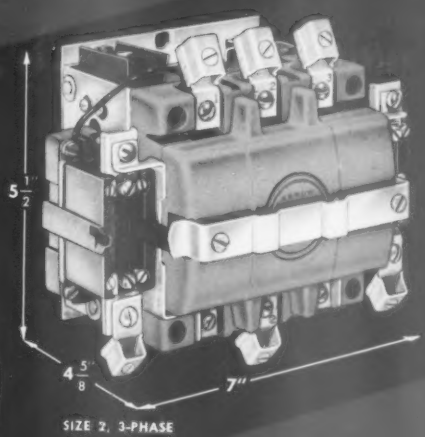
on the NEW MONARCH CATALOG

NEED A COPY?

Wherever hand or motor powered industrial vehicles are at work there is a need for the valuable facts and figures within this catalog. Just send your name and title on your company's letterhead to The Monarch Rubber Company, 350 Lincoln Park, Hartville, Ohio, and your copy will be on its way.

THE RIGHT CONTROL

FOR MODERN ELECTRICAL EQUIPMENT



SIZE 2, 3-PHASE

ARROW AH HART

TYPE "RA"

ACROSS-THE-LINE MAGNETIC MOTOR STARTERS

JUST 1/2 THE SIZE AND WEIGHT OF ORDINARY STARTERS *PLUS* ADDED PERFORMANCE, GREATER DEPENDABILITY AND STRAIGHT-THRU WIRING

An ever increasing number of forward looking manufacturers have recognized A-H "RA" Starters as the *right control* for their electrical products. They are taking advantage of the many advanced "RA" features to bring out the in-built top performance of their electric motors and electrically powered machinery.

An Arrow-Hart "RIGHT ANGLE" Starter controls this P&H Arc Welder—product of the Harnischfeger Corporation of Milwaukee. *Just right* in every way for this installation, the compact starter easily fits into a limited space with plenty of room left over for easy wiring. Reduced control size leaves more space for other operating components without increasing the overall unit size.

The exclusive Arrow-Hart "Right Angle" operating mechanism is more than just an "improvement"; it is the first real advance in starter design since the introduction of the original solenoid type. The result is radically reduced size and weight with increased operating efficiency and dependability. Straight-thru wiring is an exclusive, in-built A-H feature—not just a bus-bar arrangement—that permits time, work and space savings up to 30%. Safer direct routing eliminates crossover and makes circuit identification fast and positive. Starter sizes 0, 1, 2, 3 and 4 are available with a full line of NEMA enclosures for use in all atmospheric conditions.

BUY WITH CONFIDENCE • PROFIT BY PERFORMANCE

THE ARROW-HART & HEGEMAN ELECTRIC CO., HARTFORD 6, CONN., U.S.A.

HERE'S IMPORTANT INFORMATION

for

PLANT MANAGEMENT EXECUTIVES
PURCHASING AGENTS
NEW EQUIPMENT DESIGNERS
and MANUFACTURERS
PLANT MAINTENANCE MEN
and EVERY OTHER USER of
INDUSTRIAL MOTOR
CONTROLS

Here is the ALL-NEW Arrow-Hart Motor Control Catalog with full information on the entire A-H line. All of the controls shown above—and many more types—are included. General description and application sections are supplemented by complete engineering data including ratings, weights and dimensions, and wiring diagrams. Additional sections will be issued to cover all new models or modifications as they are made available. A handy ordering sheet and price supplement accompanies the catalog.

Whatever your requirement, there is an Arrow-Hart motor control complete with auxiliary equipment designed and built to do the job—and do it better. It's easy to find the right unit to do YOUR job in the A-H Catalog. Send for your copy today.

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 HAWTHORN STREET, HARTFORD 6, CONNECTICUT

Please send my free copy of the catalog, "INDUSTRIAL MOTOR CONTROLS"; I am particularly interested in the following type(s) of equipment: _____

_____

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POSITION _____
CO. NAME _____
CO. ADDRESS _____
CITY _____ ZONE _____ STATE _____

ARROW·HART

INDUSTRIAL CONTROL DIVISION

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
HARTFORD 6 CONNECTICUT, U.S.A.

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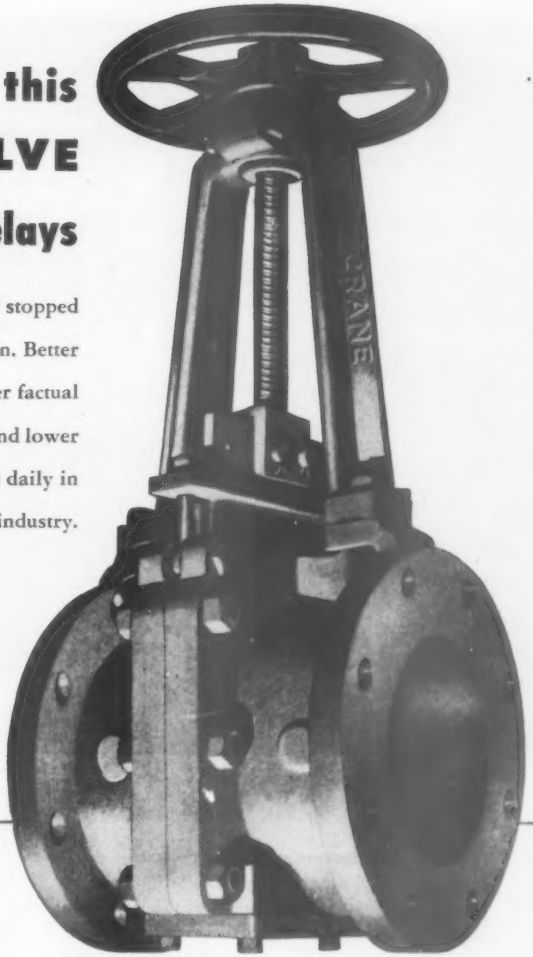
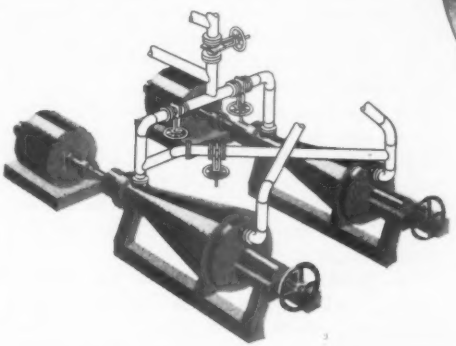
Printed in U.S.A.

this CRANE VALVE cured production delays

Here's another case where Crane valves stopped serious and costly interruptions of production. Better valve design did the trick. It's another factual demonstration of the greater dependability and lower ultimate cost of Crane valves, duplicated daily in thousands of plants in every industry.



Here are the Facts!



Where Installed: In a paper mill making strong and heavy papers for manufacture of bags. *Fluid Handled:* High consistency pulp stock being piped from pulpers to Jordan machines for refinement.

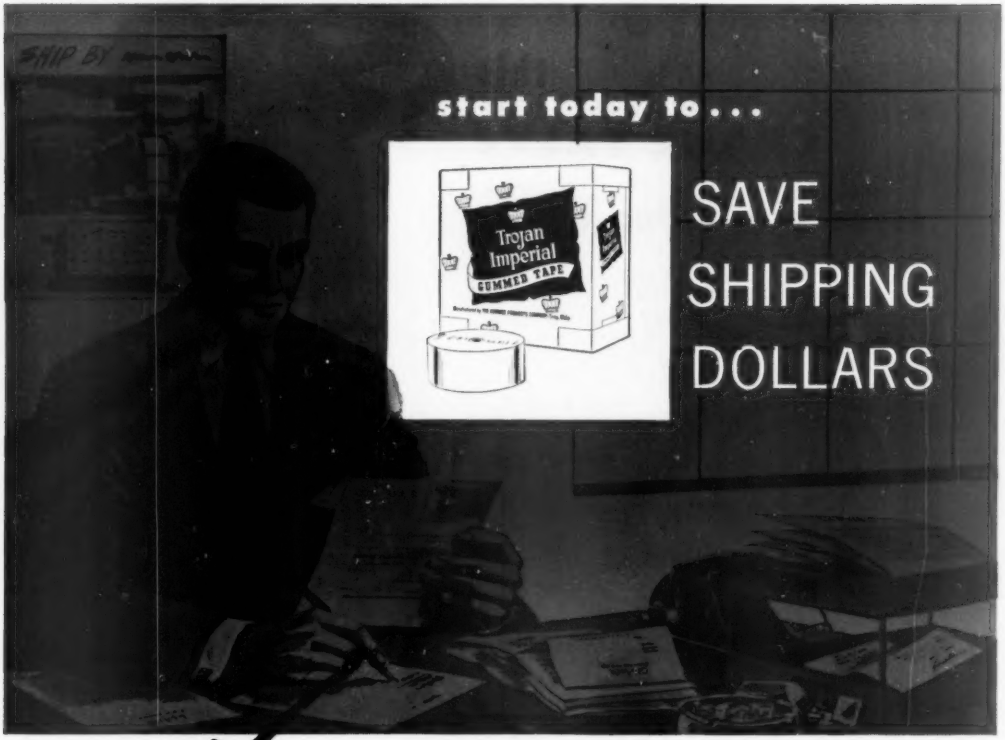
Trouble Encountered: Valves formerly used, even wide open, would entrap the pulp stock, become inoperative, and shut off flow to machines. Cleaning out the clogged valves and pipe lines was costly in time, labor, and production loss.

Solution and Result: Crane patented Pulp Stock Valves were installed. Clogging was immediately stopped. Not a single shutdown for cleanout needed for more than 5 years since Crane valves were installed.

More CRANE VALVES *are used than any other make*

CRANE CO. General Offices: 836 S. Michigan Ave., Chicago 5, Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



✓ specify Trojan Imperial sealing tape!

Every year millions of dollars and countless man-hours go down the drain because of damage "in transit" to cartons and to merchandise. In handling tons of freight daily, getting it to the proper destination on time, much current waste and loss of revenue can be traced directly to improper packaging. The resulting damage and claims lead to investigation and paper-work, requiring supporting statements and invoices—plus clerical and valuable administrative time. Trojan Imperial Gummed Tape made by The Gummed Products Company can save many of these shipping dollars!

A good many customers judge your company and your product by the appearance and condition of the packages you ship—and a freight "packer" is only as good as the materials he uses. That's why thousands of companies, large and small, rely on Trojan Imperial, a stronger, better "standard" gummed tape made of top-quality Kraft paper and adhesive. It's a tough, flexible sealing tape that meets every requirement. For package-prestige, customer good-will and trouble-free service, get acquainted with the Paper Merchant in your community—the one who handles the Gummed Products line, and ask him for Trojan Imperial.

For speed, safety, and economy—on hand or machine-sealing operations in your plant, order Trojan Imperial Standard gummed tape—every time!

The GUMMED PRODUCTS Company

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Philadelphia • San Francisco • St. Louis

WHICH costs more... the painter or the paint?

As anyone connected with industrial maintenance knows, the cost of *labor* is *at least* 80% of total painting costs.

So, it figures that any paint that slashes labor costs saves *real* money on any paint job.

Barreled Sunlight Paints may cost a little more . . . but they save *big* money where the *big* money goes . . . and they save four important ways on paint costs. Here's how:

1. Barreled Sunlight takes more thinner — and that means more paint ready for use and, actually, lower material cost.
2. Barreled Sunlight "hides" better — even after thinning, Barreled Sunlight often does a "bang-up" job in one coat where ordinary paint calls for two.
3. Barreled Sunlight covers more square feet per gallon — takes fewer gallons than other paints to do the same job.
4. Barreled Sunlight goes on faster . . . easier . . . this easier "flow" of Barreled Sunlight cuts painting costs . . . saves painter-hours.

Claims are easy to make . . . but we *prove* 'em.

An actual "on-the-wall" test — right in your own plant — will *prove* the cost-cutting features of Barreled Sunlight. For proof you can *see*, write Barreled Sunlight. Our representative will be glad to arrange the test — at your convenience and absolutely without obligation. Write today.

The famous Barreled Sunlight "on-the-wall" test lets you see with your own eyes why the true yardstick of paint value is not price per gallon but *cost per square yard* for material and labor. Men responsible for volume paint purchases in leading industrial plants and other large buildings have seen it and been convinced. May we show it to *YOU*?

BARRELED SUNLIGHT PAINT COMPANY
2G Dudley St., Providence, R. I.

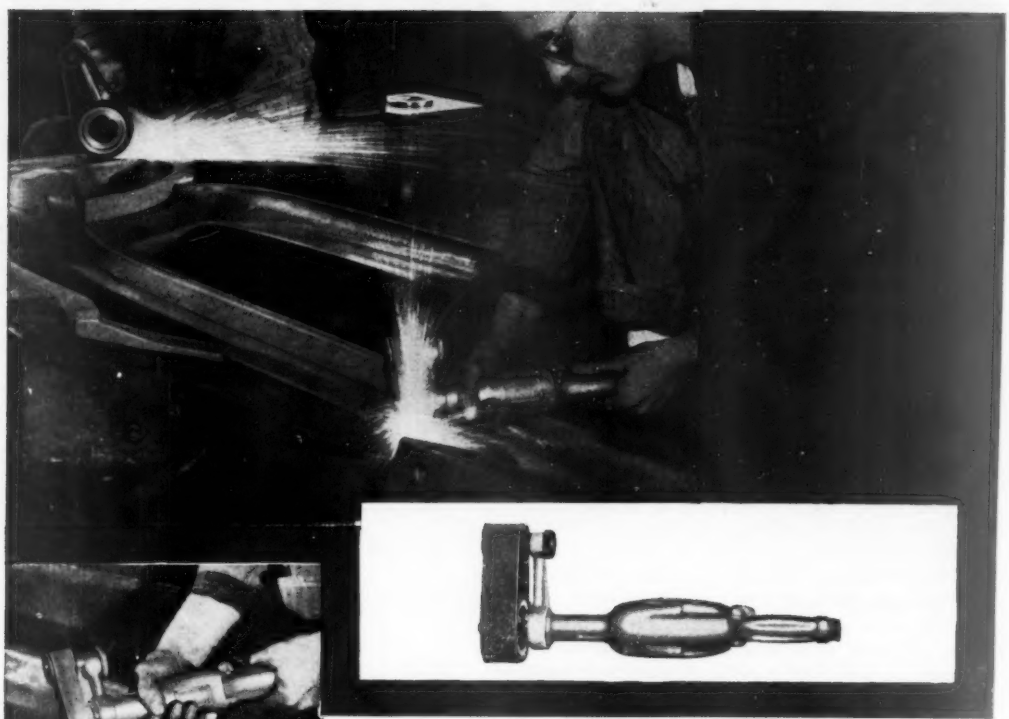
Barreled Sunlight® Paints

In whitest white or clean, clear, wanted colors, there's a Barreled Sunlight Paint for every job

IT ALWAYS COSTS MORE NOT TO PAINT!

For over half a century those who know the best in paints . . . for all types of buildings . . . have strongly insisted on famous Barreled Sunlight

NOW! NEW! BUCKEYE
BELT GRINDING ATTACHMENT



A Buckeye CALKER Horizontal Grinder, 15,000 RPM, equipped with BGA-21 Belt Grinding Attachment.

A Buckeye DARKAD Horizontal Grinder, 9,000 RPM, equipped with BGA-42 Belt Grinding Attachment.

Now—you can save up to 50% on grinding costs, using the new Buckeye Belt Grinding Attachments on Buckeye 15,000 RPM and 9,000 RPM horizontal grinders. Here, for the first time, Buckeye has successfully combined the maneuverability of the portable grinder with the utility of the abrasive belt. These compact new units will pare production time and costs on many applications where mounted wheels, abrasive discs, snagging wheels, cones and hand files have provided only a partial, costly solution to grinding problems.

Used for die and mould grinding, edge breaking, weld grinding and surface work on any contour, a Buckeye BGA will produce a good finish, free from lap, gouge or chatter marks. Attachments, designed for use with Buckeye horizontal grinders, are sold separately and may be adapted to other air and electric grinders of the proper type and speed. Write—now—for complete information.

Buckeye Tools
CORPORATION
DIVISION 13, DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

All these...and More are AMERICAN

American PHILLIPS Wood Screws with sharp gimlet points, sharp threads, well-formed heads.

American PHILLIPS "TWINfast" Wood Screws with twin threads for greater driving speed.

American PHILLIPS Type 25 Thread-Cutting Screws, for metals.

American PHILLIPS Type 25 Thread-Cutting Screws, for plastics.

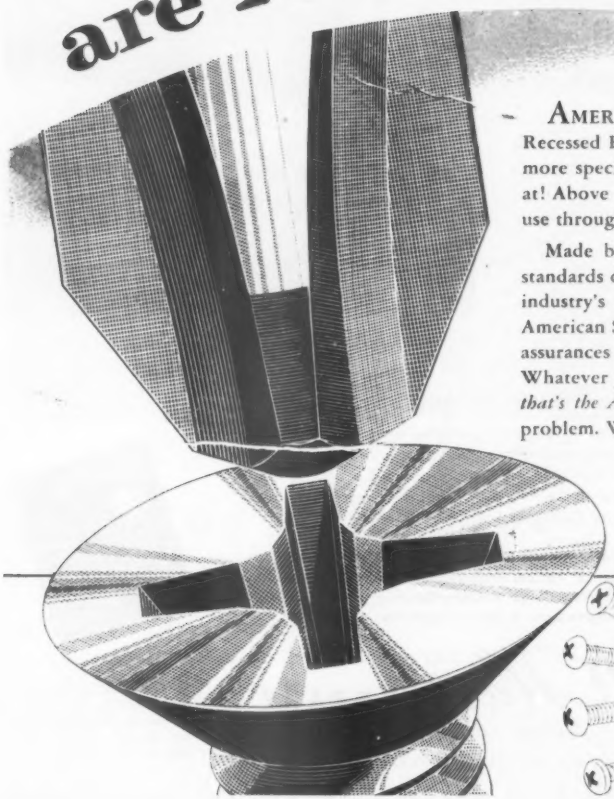
American PHILLIPS Type A Tapping Screws, for faster fastening of light-gage sheet metal.

American PHILLIPS Sems* Assemblies, pre-assembled lockwashers and screws save assembly time.

*(U. S. PATENTS NO. 2,113,424 AND 2,113,425)

American PHILLIPS Type B Tapping Screws, for assembling heavy sheet metal.

American PHILLIPS Machine Screws for fastest driving in drilled or tapped holes (or with nuts).



AMERICAN makes all types of standard Phillips Recessed Head Screws (slotted screws, too)... and more special types than you can shake a blueprint at! Above are shown some of the types in widest use throughout industry today.

Made by American craftsmen, under American standards of quality control... in one of the screw industry's most modern high-production plants, American Screws and Bolts are one of the stoutest assurances of quality control *for your own product.* Whatever you need to fasten, in the fastest way... *that's the American way.* Let's have a look at *your* problem. Write.

SINCE 1838

AMERICAN SCREW COMPANY

PHILLIPS HEADquarters

WILLIMANTIC, CONNECTICUT

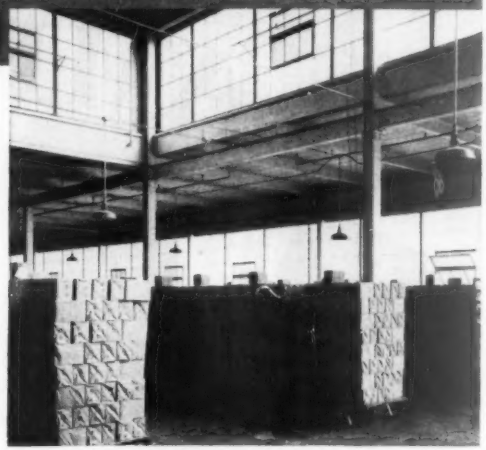
Main Office & Plant
Willimantic, Conn.
Office & Plant, Norristown, Pa.
Office & Warehouse, Chicago, Ill.

Sunshine's BRIGHT (without GLARE)

COOLITE GLASS Cuts Costs, Improves Efficiency in Sunshine Biscuits Plant

The heat absorbing properties of Coolite glass helps keep interiors of this modern plant cooler even at high noon. Coolite traps and absorbs much of the sun's heat rays, reduces the load on air conditioning equipment, saves on overall operating costs.

Glare Reducing Coolite also filters out annoying glare in work areas and cafeteria. The plant is flooded with softened, filtered light that cuts costly eye fatigue. Employees *feel better, work better,* when they *can see better.*



Approximately 10,000 window lights of Coolite, Heat Absorbing and Glare Reducing Glass are installed in this well-daylighted Sunshine Biscuits plant.

See How COOLITE Can Save Money For You

If you are planning to build new facilities or modernize existing ones, it will pay you to find out how Coolite, Heat Absorbing and Glare Reducing Glass can provide increased efficiency and economy. The cool blue-green color of Coolite adds a modern note to any exterior. Coolite's filtered light boosts employee morale, reduces rejects. See your nearby Mississippi Glass distributor today.

Translucent, light diffusing figured and wired glass by Mississippi is "visioneered" for better daylight illumination. Available in a variety of patterns and surface finishes, all scientifically designed to distribute light to best advantage.

Send for free Coolite catalog, "Coolite Heat Absorbing and Glare Reducing Glass." Samples on request.

MISSISSIPPI *Glass* COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

From the Filice & Perrelli Canning Co., Inc., Richmond, California, warehouse, an 80-case load is delivered to a terminal across the street.

TOWMOTORS IN ACTION IN U. S. INDUSTRY

quick as a flash . . .

Towmotor speeds from here to there, inside the plant and out, all day long. Speed handling, production, and deliveries with Towmotor fork lift trucks. For the name of your nearest Towmotor Representative and an illustrated brochure, "Handling Materials Illustrated," write Towmotor Corporation, Div. 5, 1226 E. 152nd Street, Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG®

FORK LIFT TRUCKS AND TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

this weight-lifter measures

Milwaukee Crane and Service Co. of Cudahy, Wisconsin uses a 32" LeBlond Heavy Duty to machine cable drums for their big cranes. A single cut, the full length of the work, straightens and sizes the castings. Spindle speed, 18 rpm; feed, .062 ipr; depth of cut, 1"; tool, carbide. Spiral cable grooves are then chased with a high speed steel form cutter. Spindle speed, 8 rpm; depth of cut, .062". Other work performed by Milwaukee Crane and Service Co. on their LeBlond lathes includes turning and boring gear blanks, crane wheels, pulleys, shafts, and couplings.

his might in tons

If you want to see precision machinery applied to mammoth work, Milwaukee Crane and Service of Cudahy, Wisconsin can show you. At the heart of every giant Milwaukee crane lie rugged precision parts ready for smooth continuous operation hour after hour . . . for years.

Take the cable drums of these giant weight-lifters. Milwaukee Crane turns and grooves them fast and efficiently on a 32″ LeBlond Heavy Duty lathe, recommended by LeBlond's Chicago office. First a carbide tool takes a heavy cut, straightening and sizing the 8000-pound cast drums. Then the seat for the cable winding is grooved with a high-speed steel form tool much like a thread-chasing operation. These fast, chatter-free operations fit Milwaukee Crane's needs like a crane-operator's glove.

Big jobs like this get pared to workable size by the new 32″ LeBlond Heavy Duty lathe with standard 4-way rapid traverse. The 32-speed spindle, rigidly supported by four anti-friction bearings, is smoothly driven by hardened and ground steel gears. Other well-known LeBlond features are, of course, standard equipment—hardened and ground replaceable steel bed ways, totally enclosed quick change box, thrustlock tailstock, and many more.

Whether you turn massive workpieces to close tolerances or "watch charm" parts in mass production, LeBlond has a lathe that will turn them faster, better. Your nearby LeBlond distributor will tell you about LeBlond's complete line. Call him or write

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Bulletin HD 163 H for more information on the 32″ LeBlond Heavy Duty Lathe

turned faster by LeBLOND of Cincinnati

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 64 YEARS*

Pneumatic Cylinders

Really complete, the Hannifin line of pneumatic cylinders is made with two types of pistons . . . bores from 1″ to 16″ . . . six standard mountings. Really standard, these cylinders are tooled to tolerances that assure accurate mounting to make assembly to your machines easier. Really built, each cylinder is "TRU-BORED" and honed, piston rods are ground and polished, interchangeable end caps, heavy duty tie rods . . . rugged, yet precision construction throughout!

Write for Bulletin 210

NOW...

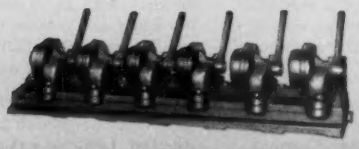
HANNIFIN HAS THE MOST COMPLETE LINE OF AIR CONTROL EQUIPMENT!

Disc Type Air Control Valves

Designed for smooth, positive and accurate control of air-operated equipment. Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation. Sizes from ⅛″ to 1¼″ I.P.S.

Write for Bulletin 57-W

Manifold valves for control of several cylinders from one point



Hannifin "Directair" electrically controlled air-operated disc valve

Foot-operated treadle valve (Also spring return and rotary types)

Standard hand control valve (Single or duplex)

AIR WARDEN

Hannifin "Air Warden" units are the finest protection possible for air-operated equipment. Complete units include: (1) Air Filter which removes grit, dirt, scale, moisture, emulsified oil; (2) Self-Bleeding Pressure Regulator that assures absolute stability of secondary pressure; and (3) Atomizing Type Lubricator fillable without shutting off air pressure. Components also sold separately. Write for Bulletin 1010B

do ALL you CAN do... with

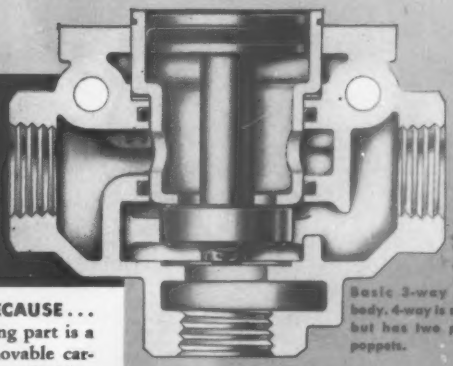
HANNIFIN

Hannifin Corporation, 1157 S. Kilbourn Ave., Chicago 24, Ill.

Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves

PLUS... A Line of Valves Every Maintenance Man Will Appreciate!

NEW HANNIFIN *P-M* *Pilot-Master Valves*



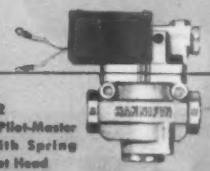
Basic 3-way valve body. 4-way is similar but has two piston poppets.

THIS NEW DESIGN REDUCES DOWN TIME, BECAUSE... there are no springs in the main valve... only moving part is a piston-poppet assembly which fits in an easily removable cartridge, replaceable without disturbing line connections. Besides, in the entire line, there are only two body designs, one for 2-way and 3-way, another for 4-way. The basic 3-way valve operates either 2-way or 3-way, normally open or normally closed, without any internal change whatever. Interchangeable heads give choice of pneumatic or electric control. What all this means is fewer valves to stock, fewer parts to stock, less time lost replacing valves, parts, or control heads.

- **Fewer Valves to Stock**
- **Fewer Parts to Stock**
- **Maximum Interchangeability**
- **No Springs in Main Valve**

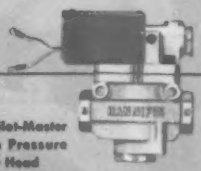
Three Types of Head Fit One Body

(Top flanges are same size for every body size, ⅜" to 1¼" I.P.S.)



SERIES B-2 Solenoid Pilot-Master Valve with Spring Return Pilot Head

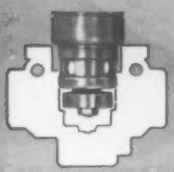
SERIES B-1 Master Valve with Plain Head for Remote Control



SERIES B-3 Solenoid Pilot-Master Valve with Pressure Return Pilot Head

features you find in no other valves, compare!

New cartridge design—instantaneous operation, provides speeds to 600 cycles per minute—continuously rated, low amperage solenoids, positively mounted—full pipe capacity—pressure range from 15 to 150 P.S.I.—corrosion resistant throughout—will operate on liquids as well as air—choice of 10 Pilot Valves, ¼" I.P.S., for remote control of Master Valves.



Exclusive Replaceable Cartridge

Contains every moving part of Master Valve. Two sizes fit all 5 valve sizes. Easily replaced without disturbing main piping connections.

Write for the Complete Story

Get it today!

Bulletin 231. Shows and tells all about the new Hannifin P-M line... Pilot Valves, Master Valves, Pilot-Master Valves... 2-way, 3-way, 4-way.

HANNIFIN

Hannifin Corporation, 1157 S. Kilbourn Ave., Chicago 24, Ill.

Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves

HELP YOURSELF...to TWO

In the hands of the CARBORUNDUM engineer, the new "61" Port-A-Belt Grinding Attachment...on the desk, the new "T-61" Hub Wheel assembly.

Look to CARBO

TRADE

"Carborundum" and "Port-A-Belt" are trademarks of The Carborundum Company, Niagara Falls, New York

BRAND-NEW abrasive ideas!

Within the past thirty days, two entirely new concepts in grinding have been brought to you through CARBORUNDUM engineering. Backed by long months and years of design and development work, these new techniques are now ready to go to work, earning a bigger profit for you.

You can profit by both of these brand-new developments—for they have been created with just one purpose in mind... to cut your grinding and polishing costs to the bone. Both new products happen to apply to abrasive *belt* performance—the "61" Port-A-Belt which now makes portable belt grinding a reality—the "T-61" Hub Wheel which can cut contact wheel replacement costs in half. Next month, the headline development might be a new abrasive *wheel.* That's the tremendous and exclusive advantage you enjoy in doing business with CARBORUNDUM. Offering *all* abrasive products, we have just one axe to grind... yours!

Here are only a few of the 30,000 reasons why you get the RIGHT combination of abrasive and method only from CARBORUNDUM

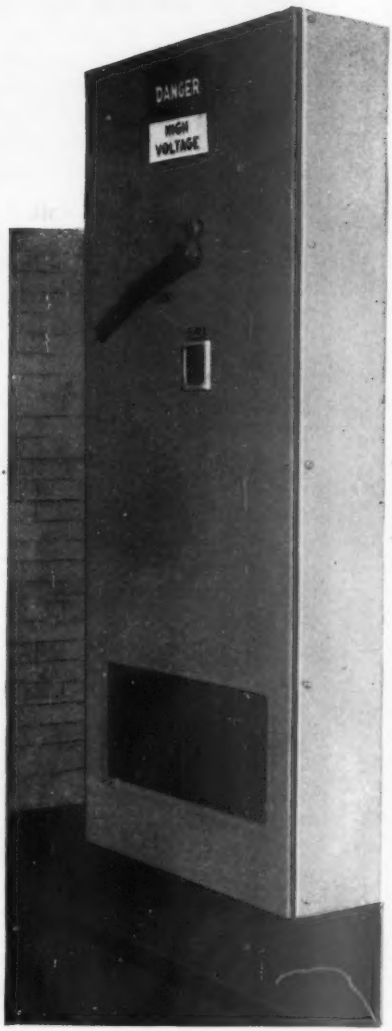
You benefit when you call in your CARBORUNDUM or distributor salesman on any abrasive problem you have. Nowhere else can you get the unbiased counsel you have a right to expect. You'll find him listed in the yellow pages under "Abrasives." Call him today—it's to your profit!

RUNDUM

MARK

for the NEW developments in ALL abrasive products

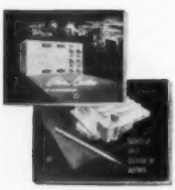
The best way to keep Power Distribution in step with Plant Expansion!



Rock Hill Printing and Finishing Company had a power problem that plagues many industries today. Their rapidly expanding plant was simply growing away from its power source. The resulting overextension and overloading of feeders created conditions that always hamper production: excessive line losses . . . poor voltage conditions . . . frequent service interruptions. But note how effectively a Westinghouse Power Center—serving as an additional distribution point—solved the problem . . .

> "After the installation, we found voltage conditions improved as much as 10 percent . . . line losses reduced 5 percent . . . and unnecessary tripping out completely eliminated.
>
> "Remarkably little time and engineering effort were required in making the installation. We found it almost as simple as plugging in an appliance. And we saved nearly 2000 feet of cable as a result of shorter, low-voltage runs."

This Westinghouse Dry-Type Power Center will enable this user to realize even further savings. The elimination of vaults, oil conditioning and testing, promises a saving in maintenance, virtually eliminates fire hazard, and provides greater safety for operating personnel. Westinghouse Power Centers offer these same advantages to you. J-60777



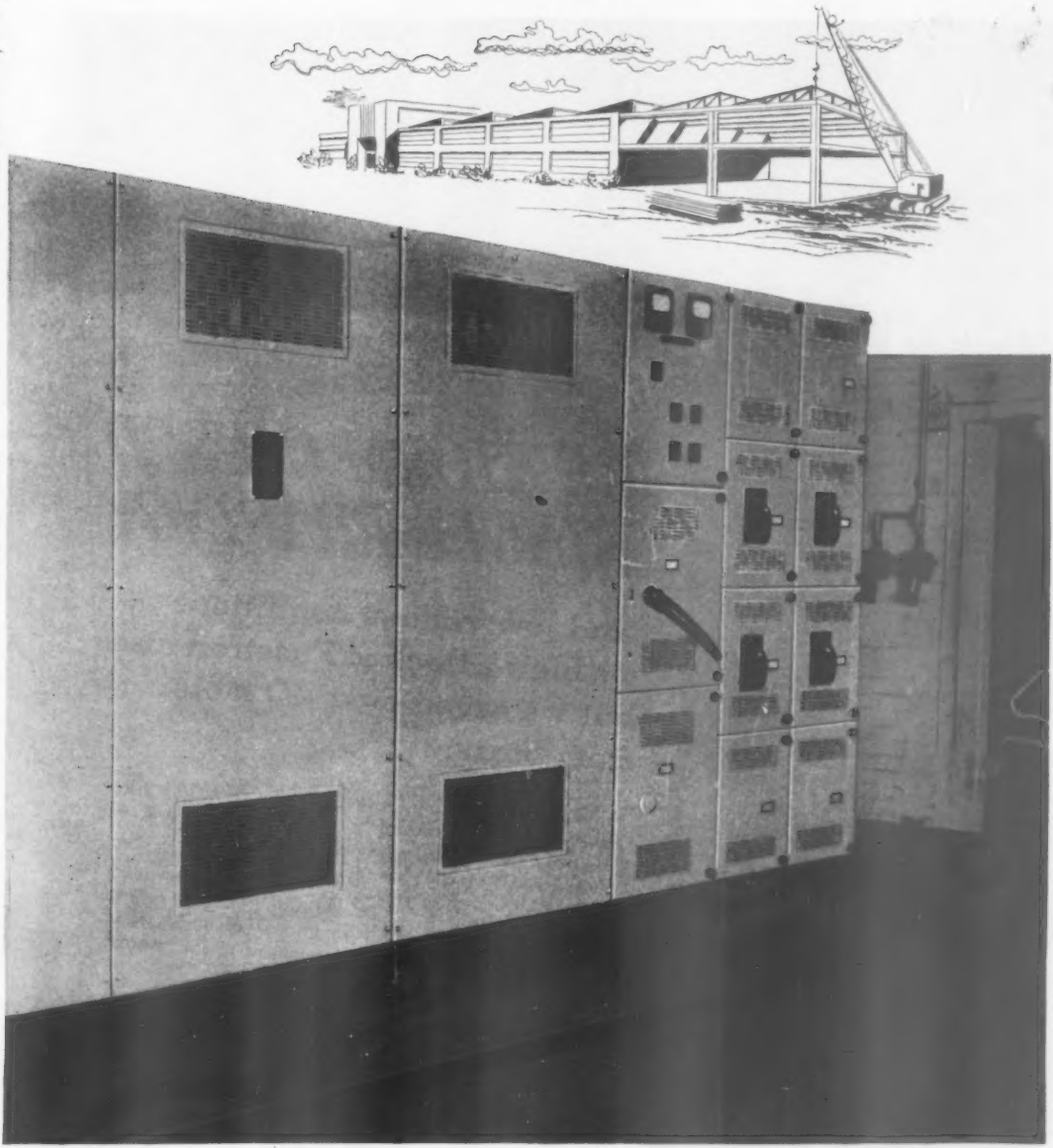
GET THE COMPLETE STORY

Westinghouse Power Centers are the key to efficient power distribution. They offer better service continuity, greater flexibility, better regulation—all the things that contribute to power distribution economy. Most important, they provide the simplest, lowest cost way of attaining the power system that best meets your operating requirements.

Booklet B-4162 covers Westinghouse Power Centers in detail. Booklet B-4045 discusses various types of plant distribution systems wherein Power Centers offer maximum advantage. For your copies contact your Westinghouse Representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

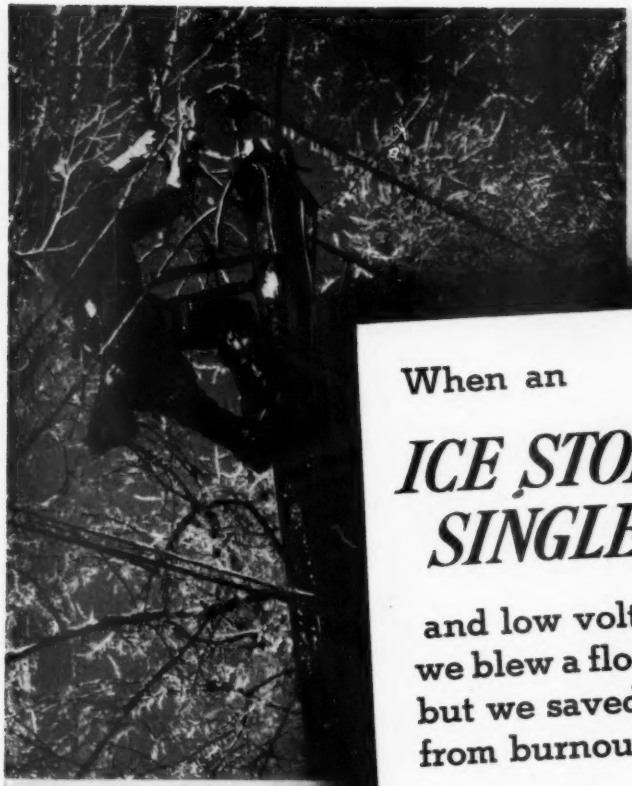
YOU CAN BE SURE... IF IT'S Westinghouse

POWER CENTERS



AT ROCK HILL PRINTING AND FINISHING COMPANY

Rock Hill, S.C... this Westinghouse Dry-Type Power Center is part of a distribution system as modern as the plant additions it serves. Located near the center of load it makes possible shorter secondaries, lower line losses, better regulation.



When an

ICE STORM CAUSED SINGLE PHASING

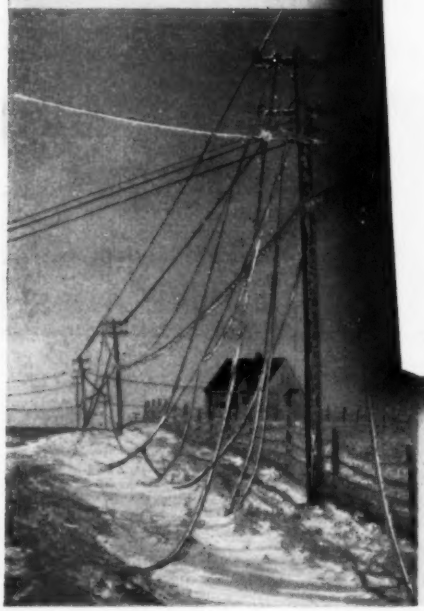
and low voltage conditions . . we blew a flock of Fusetron fuses but we saved over 40 motors from burnout

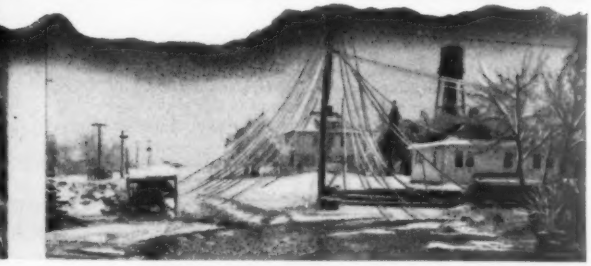
"For twenty-four hours after the bad ice storm of February 15, 1950 we were endangered by single phasing and low voltage conditions due to the damage done the power lines by the ice.

"During this period, we blew a flock of Fusetron dual-element fuses—around 240 in fact—but we figure that was a very cheap price to pay for saving over 40 motors from burning up.

"After this experience we didn't lose any time in putting all of our plant and equipment under Fusetron Fuse protection."

Michael G. Kupcho,
Master Mechanic
Ashland Shirt and Pajama Company
Ashland, Pennsylvania





You too, can be safe from electrical hazards by using

Fusetron (DUAL ELEMENT) Fuses

They provide 10 Point Protection

1 *Protect against short-circuits.

2 Protect against needless blows caused by harmless overloads.

3 Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation.

4 Provide thermal protection — for panels and switches against damage from heating due to poor contact.

5 Protect motors against burnout from overloading.

6 Protect motors against burnout due to single phasing.

7 Give DOUBLE burnout protection to large motors — without extra cost.

8 Make protection of small motors simple and inexpensive.

9 Protect against waste of space and money — permit use of proper size switches and panels.

10 Protect coils, transformers and solenoids against burnout.

*Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York City in December 1947.

It migh
were op

Mutual Photo

"Obtainin
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FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

DON'T RISK LOSSES IN YOUR PLANT

Delay may cost you more than replacing every ordinary fuse with a FUSETRON dual-element Fuse — but by passing the word along that all purchase and stock records should call for FUSETRON dual-element fuses, you have action that begets money saving.

SEND THE COUPON FOR MORE FACTS

Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo. (Division of McGraw Electric Co.)

Please send me complete facts about FUSETRON dual-element Fuses.

Name _____ Title _____

Company _____

Address _____

City & Zone _____ State _____ 752

(FUSETRON is a trade mark of Bussmann Mfg. Co., Division McGraw Electric Co.)

the greatest testimonials in roofing are written in the skylines of America

Barrett* built-up roofs, applied by Barrett Approved Roofers, protect a preponderance of America's great commercial, industrial and public buildings.

We know of no stronger evidence of roofing protection that we or anyone else in the world can offer you.

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*Reg. U. S. Pat. Off.

You don't have to pay BIG MONEY to get BIG TRUCK advantages

Industry cuts handling costs with YALE *WORKSAVERS*

YALE WORKSAVER Electric Trucks are ideal where size and weight make big trucks impractical...over low-load floors; in freight elevators; railroad cars and trucks.

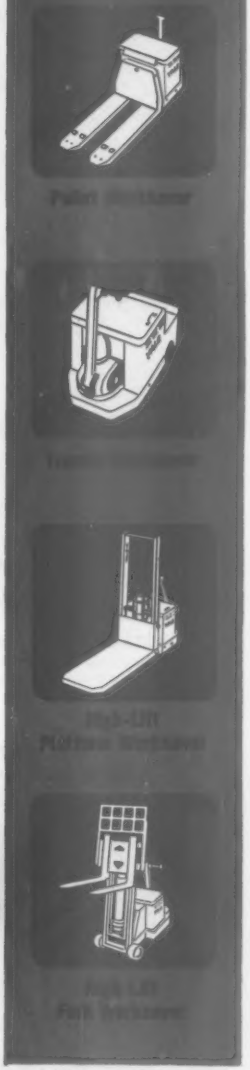
Industry prefers YALE WORKSAVERS because they offer big-truck efficiency for less cost, plus these big truck advantages: forward and reverse power travel...powerful hydraulic lift.

MAKE THE MOST of your time and space ——YALE Electric Worksavers, industry's leading *powered* hand trucks, move loads up to 7,500 lbs. into and out of *all* storage and production areas.

MAKE THE MOST of your manpower ——one part-time operator and a YALE Worksaver transport, lift and stack multi-ton loads safely, surely and smoothly.

*Heavy-duty platform Yale WORKSAVERS**

***Yale's Electric Hydraulic Powered Hand Truck**



ASK YOUR YALE REPRESENTATIVE FOR A FREE DEMONSTRATION OF THE WORKSAVER LINE

See how their many practical advantages and money-saving features can be put to work for you. Be sure to ask about the famous Worksaver *Power Team*—Truck, Battery, Battery Charger.

YALE & TOWNE

Yale is a registered trade mark of The Yale & Towne Manufacturing Co.

MAIL THIS COUPON TODAY

The Yale & Towne Manufacturing Co., Dept. 37
Roosevelt Blvd. & Haldeman Ave., Phila. 15, Pa.

I want to know how YALE WORKSAVERS can help me.

☐ Please have your local Representative call.

☐ Please send free copy of GEMS OF LOW COST MATERIALS HANDLING.

Company_____

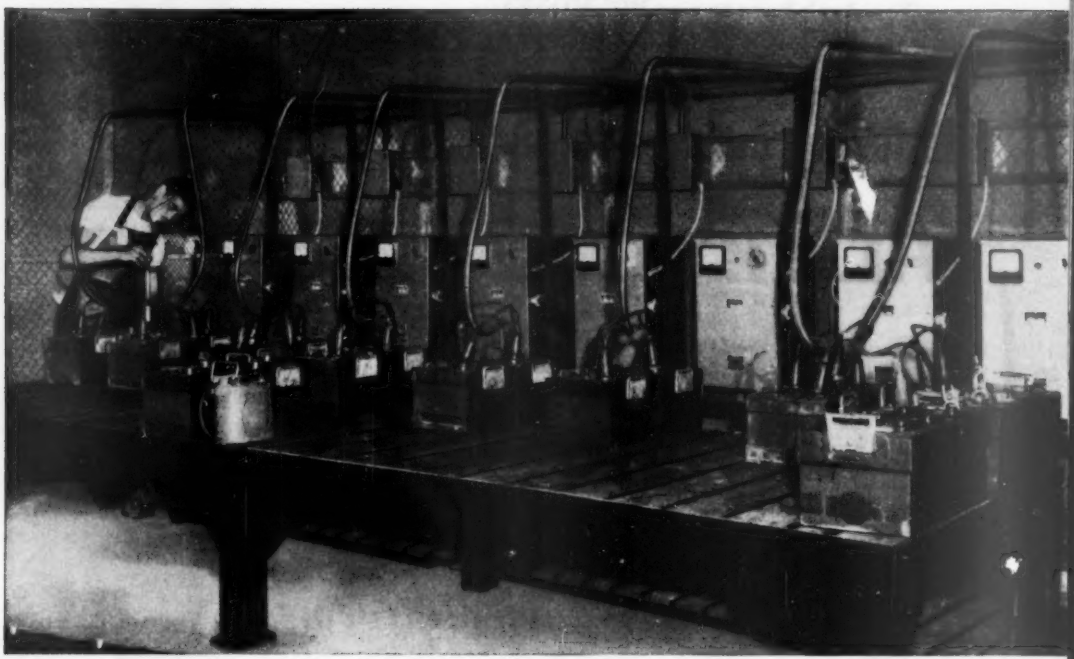
Name_____ Title_____

Street_____

City_____ State_____

In Canada write: The Yale & Towne Mfg. Co., St. Catharines, Ont.

YALE GAS AND ELECTRIC TRUCKS • YALE *WORKSAVERS* • YALE HAND TRUCKS • YALE HAND AND ELECTRIC HOISTS • YALE PUL-LIFTS

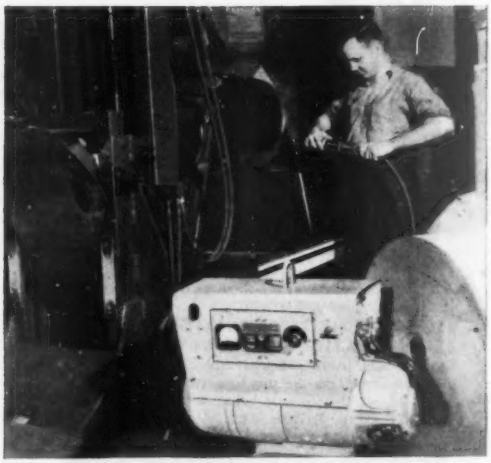


LARGE INSTALLATION of metallic-rectifier chargers provides a flexible power supply which is economical regardless of charging load. Grouping permits central record keeping and supervision.

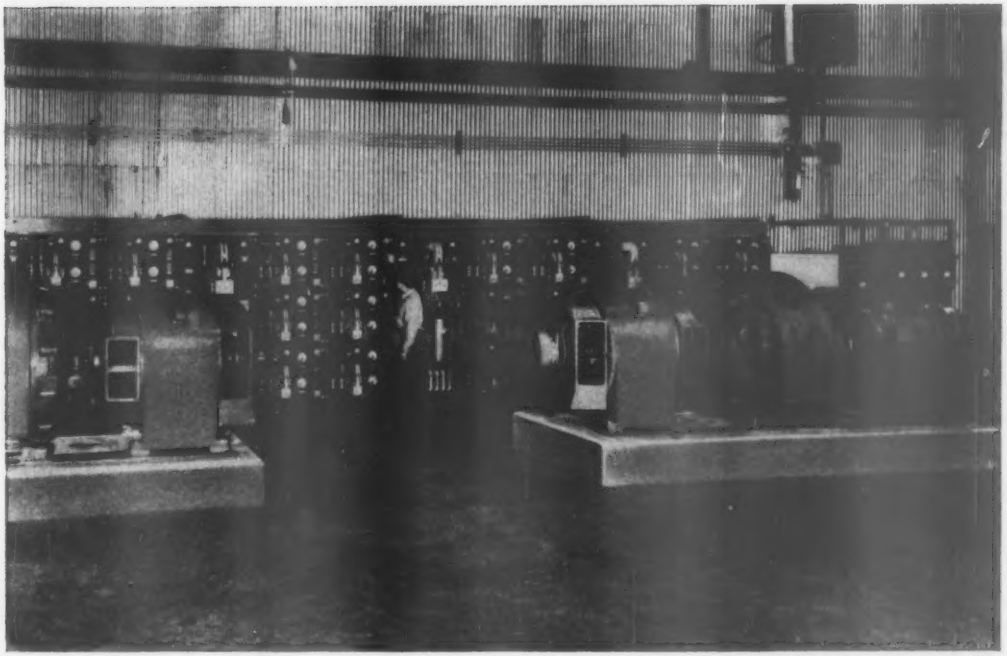
Since no special foundation is required, individual units may be added or removed or entire station relocated to meet changing needs. Each unit can be used to charge a variety of batteries.

Eliminate guesswork in

FOR SMALLER OPERATIONS, and to save time by spotting chargers throughout large plants, individual metallic-rectifier chargers are ideal. Automatic controls assure proper charging, and only maintenance required is occasional dusting.



SIMPLE TO OPERATE, portable and compact, describe new G-E single-circuit, universal-type chargers. A few adjustments permit charging many sizes of nickel-alkaline and lead-acid batteries. Protection and automatic control are built in.



FOR LARGE FLEET OPERATORS, multiple-circuit charging equipment like this is tailored to exact needs. This installation is designed to charge 24 sets of 30-cell, 1500-amp-hr batteries. To save space, only the control panel need be located in the charging area. For some large plants it is desirable to locate several smaller rotating chargers throughout the plant.

battery-charger selection

Builders of battery chargers for every use, G.E. helps you with impartial advice on the best types for *your* needs

No one battery charger is right for every job. That's why General Electric builds a *complete line* of rotating and rectifier units. And because we do, you can rely on the recommendations of your G-E representative or equipment supplier as sound and impartial.

This application help is based on a thorough study of your particular requirements. Here are three important ways you benefit: (1) you get equipment that will do the job dependably and economically, (2) you are assured of not buying more elaborate equipment than you need, and (3) you receive advice and suggestions for making the most efficient use of the battery-charging equipment selected.

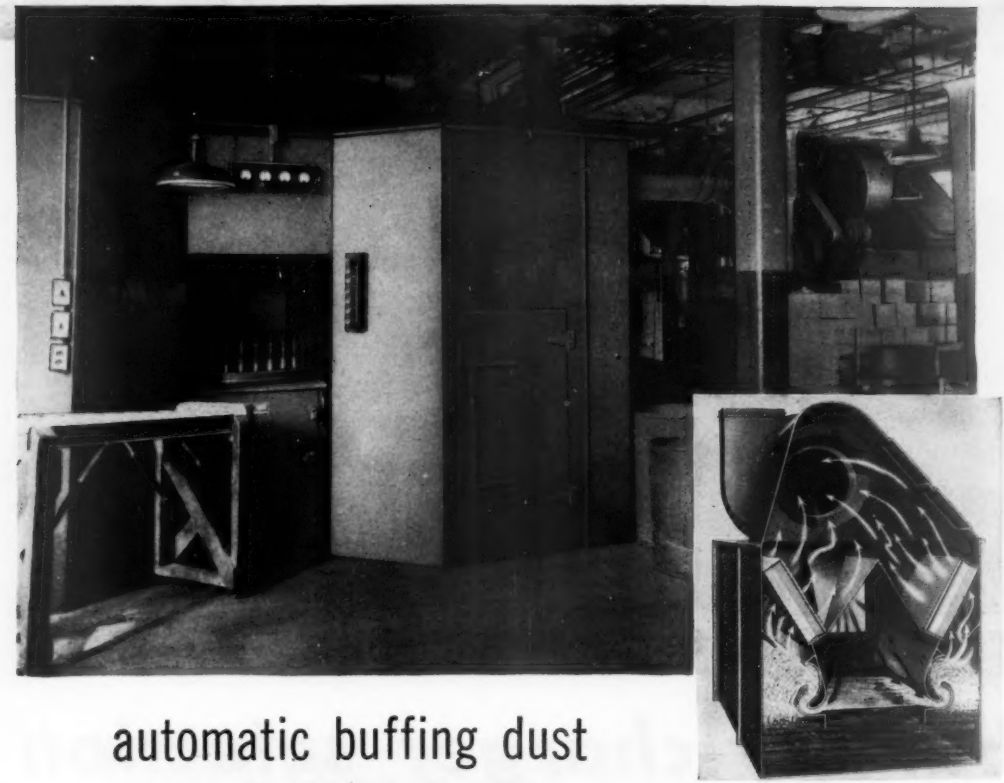
Whether you operate a few electric trucks or a large fleet, your G-E representative or equipment supplier offers you the most for your charger dollar: a complete selection of top quality equipment plus sound application advice based on years of experience. Be sure to contact him when making plans for new charging equipment. General Electric Co., Schenectady 5, N. Y. 669-1

ENGINEERED ELECTRICAL SYSTEMS FOR MATERIALS HANDLING

Conveyor drives • Crane drives • Hoist drives • Industrial truck drives and battery chargers

GENERAL ELECTRIC

Automatic Buffing Operation Exhausted by Type N ROTO-CLONE Arrangement B.



automatic buffing dust
IS DIFFERENT!

This Arms Manufacturer Finds Type N ROTO-CLONE Collectors The Practical Answer For Clean Air . . . Better Housekeeping.

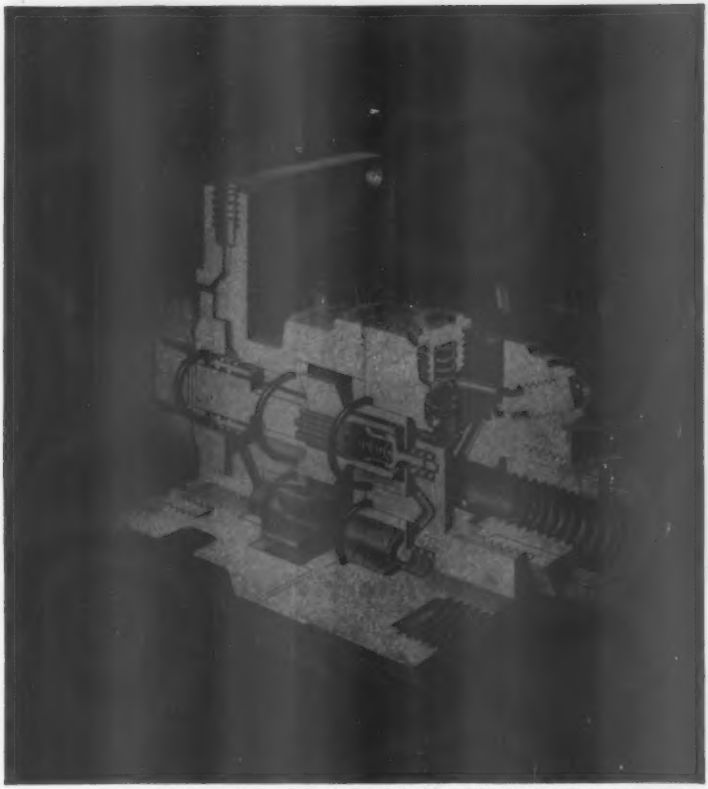
Buffing dust has individual characteristics that create a special problem. It is composed mainly of linty particles from buffing wheels which are often impregnated with sticky compounds. Automatic buffing produces this dust in quantities and its sticky nature makes it both difficult to control or to efficiently exhaust by ordinary methods. However, a large arms manufacturer is one of many concerns which has successfully solved this problem with AAF Type N ROTO-CLONES.

The Type N ROTO-CLONE is a Hydro-Static Precipitator providing collection efficiencies of more than 99%. This makes recirculation of cleaned air practical in most cases. In the Type N dust is separated from the air by means of a water curtain created by an induced flow of air through a specially designed impeller. Combined washing and scrubbing action produces high collection efficiencies on all types of dust. Arrangements are available for both manual and automatic removal of sludge.

Regardless of your clean air requirements or dust problems look to AAF for practical engineering solutions. AAF representatives are located in all major cities. Write for Bulletin 277.

American Air Filter
COMPANY, INC.
361 Central Avenue, Louisville 8, Kentucky

American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California

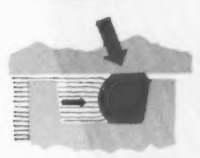


Cutaway view showing O-rings in Pesco hydraulic pump for aircraft and industrial applications.

Simplified Leakproof Seals

WITH PARKER O-RINGS

THIS IS IT



Cross section drawing of O-ring in groove, sealing under pressure.

PARKER synthetic rubber O-rings are simple to use, simple to replace. They require no complicated product design . . . a simple groove is all that is needed. Economical in first cost, they provide perfect, leakproof sealing with economy of weight and space . . . can be used in moving and non-moving applications.

PARKER is the one source for all standard O-rings to meet specifications covering fuel, hydraulic and engine oil services . . . and for special service O-rings of tested and approved compounds. Your Parker O-ring distributor listed at the right will give you Catalog 5100 . . . or write direct to The PARKER Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

Parker

TUBE FITTINGS • VALVES • O-RINGS

Plants in Cleveland • Los Angeles • Eaton, Ohio • Berea, Ky.

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O-RINGS

ARE STOCKED BY THESE AUTHORIZED DISTRIBUTORS

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Hercules Gasket & Rubber Co.
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CHICAGO, Ill.
Air Associates, Inc.
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Shields Rubber Co.
564 W. Randolph St., Chicago 6, Ill.

CLEVELAND, O.
Cleveland Ball Bearing Co.
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Neff-Perkins Co.
1360 West 9th St., Cleveland 13, Ohio

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Air Associates, Inc.
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Metal Goods Corp.
6211 Cedar Springs Rd., Dallas 9, Tex.

DENVER, Colo.
Metal Goods Corp.
2425 Walnut St., Denver 2, Colo.

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Adca Industries
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INDIANAPOLIS, Ind.
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229 E. South St., Indianapolis 25, Ind.

KANSAS CITY, Mo.
Metal Goods Corp.
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Synthetic Rubber Products Co.
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MIAMI, Fla.
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International Airport, Miami, Fla.

MILWAUKEE, Wis.
Allrubber Products & Supply Co.
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MINNEAPOLIS, Minn.
Van Dusen Aircraft Supplies, Inc.
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Minneapolis 5, Minn.

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Shields Rubber Co.
137 Water St., Pittsburgh 22, Pa.

PORTLAND, Ore.
Hydraulic Power Equipment Co.
2316 N. W. Savier St., Portland 10, Ore.

ST. LOUIS, Mo.
Metal Goods Corp.
5239 Brown Ave., St. Louis 15, Mo.

TULSA, Okla.
Metal Goods Corp.
302 North Boston, Tulsa 3, Okla.

WICHITA, Kan.
Standard Products, Inc.
650 E. Gilbert, Wichita 11, Kan.

CANADA
Railway & Power Engineering Corp., Ltd.

BUILT FOR TODAY'S GREATER POWER NEEDS

THE IMPROVED

for battery-electric trucks of all types, sizes and makes

IT'S OUTSTANDING... in design, performance, length of life. Back of the improved Exide-Ironclad battery are years of progressive research-engineering that have developed a continuous flow of improvements. *Now comes another great advancement*...

A NEW and EXCLUSIVE FEATURE—the polyethylene insulating tube sealer. This and other major improvements combine to make Exide-Ironclad, *more than ever before*, YOUR BEST POWER BUY ... AT ANY PRICE.

BUILT TO GIVE YOU...

RAPID ACCURATE HANDLING... UNIFORM RATE OF HANDLING... HIGH AVAILABILITY... LOW OPERATING COSTS ... LOW MAINTENANCE COSTS... LOW DEPRECIATION COSTS... HIGH MANEUVERABILITY... SAFE HANDLING

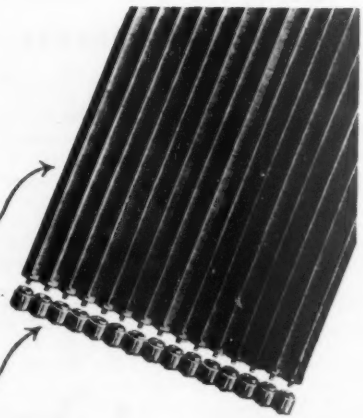
BECAUSE OF...

IMPROVED POSITIVE PLATE CONSTRUCTION

... the long-life grids now contain SILVIUM—an alloy of silver, lead and other components—which make them highly corrosion resistant. Top conducting bar is heavier.

...with the New Polyethylene insulating tube sealer

An insulating sealer for the bottom of the tubes. Acid-proof, non-corroding plastic, it fits snugly into slotted tubes of positive plate, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus, more active material remains available, and the high battery capacity is sustained for longer working life.



PERMANIZED NEGATIVE PLATES

Improved processing, a result of Exide Quality Control assures uniform plates with higher electrical efficiency. These negatives, teamed with the improved positive plates, give you a well-balanced combination for hard service and long life.

NEW SEALING COMPOUND

Through the cooperative efforts of Exide Laboratories and the Franklin Institute, a new homogeneous compound was developed. It makes a permanent seal between the jar and cover, resisting shock without cracking in high or low temperatures.

SEAMLESS SHOCK-PROOF JAR

Made of high quality rubber. A scientifically selected combination of tensile strength and elongation provides a sturdy jar built for long life and heavy-duty service.

CORROSION RESISTANT TRAY GUARD

A plastic acid-resistant steel tray coating with high insulating quality and ability to withstand hard knocks.

NEW UNBREAKABLE PLASTIC VENT PLUGS

Made of unbreakable polyethylene. Can be quickly and easily removed to add water.

Types and sizes for storage battery applications in all heavy-duty services.

Write today for further information.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

EXIDE-IRONCLAD and "PERMANIZED" *Reg. Trade-marks U. S. Pat. Off.* "SILVIUM" *T. M. Reg. applied for*

steel clad wiring systems offer protection...security...permanence unequalled by any other system

specify

steel clad wiring systems

for all installations

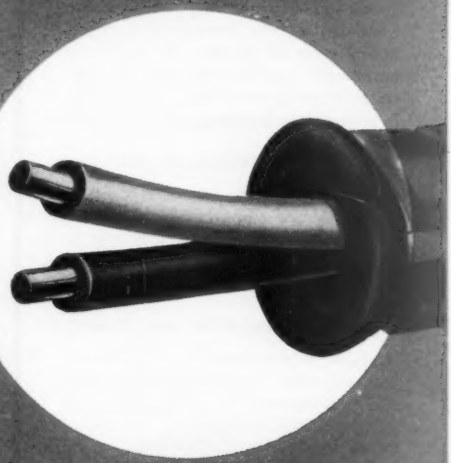
they provide:

- Protection against shock. Steel raceways are completely grounded systems.
- Protection from external mechanical damage to prevent time-consuming breakdowns.
- Protection against moisture.
- Protection against corona cutting and breakdowns on high voltage work.
- Protection against fire hazards.
- Protection against tampering.

steel for permanence...
grounded for safety

save time and money with

...the complete, ready-to-use,



ABC is the *fastest* type steel clad system to install.

Easiest to handle . . . Easy to carry.

Wires and raceway are installed together.

One piece from outlet to outlet.

No special tools . . . No waste . . . No threading . . . No coupling.

ABC CABLE

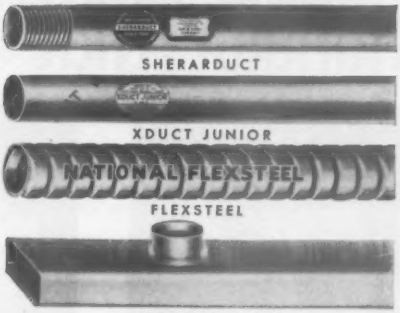
steel clad wiring system

plus these extra ABC features

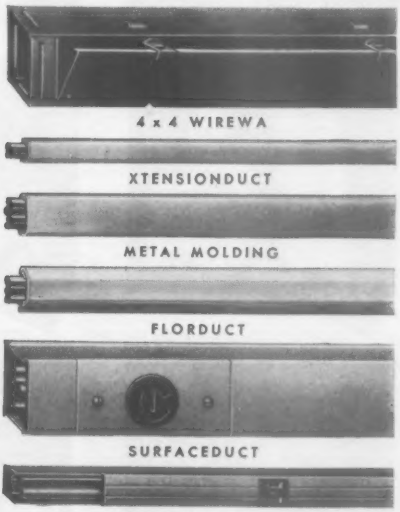
- *Anti-Short Bushing*—Protects wires from armor edges.
- *Dilec-Safecote*—Insulated wires, flame retardant, moisture resistant, easy to strip.
- *2 Double Paths to Ground on Sizes No. 14 and No. 12*—(1) Flat grounding strip for continuous low-resistance path (2) Armor, with "bondhook" channel construction, assures positive ground.

Other National Electric Steel Clad Wiring Systems

Conduit Systems



Surface Raceway Systems



Busway Systems

Listed by Underwriters' Laboratories, Inc. Sold through leading electrical wholesalers. For complete information, write to National Electric Products Corporation, 1347 Chamber of Commerce Bldg., Pittsburgh 19, Pa.

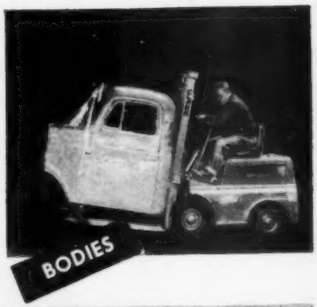
EVERYTHING IN WIRING POINTS TO

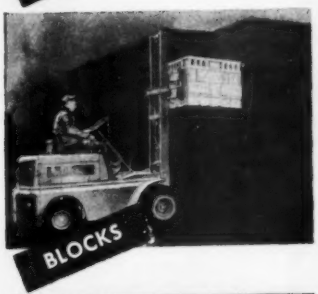
National Electric Products

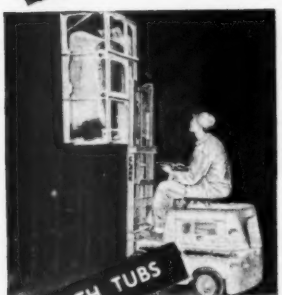
PITTSBURGH, PA.

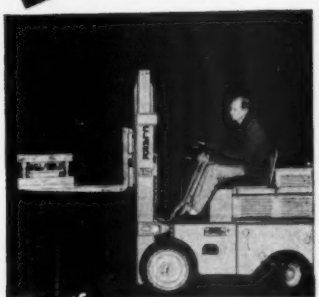
3 PLANTS • 6 WAREHOUSES • 42 SALES OFFICES

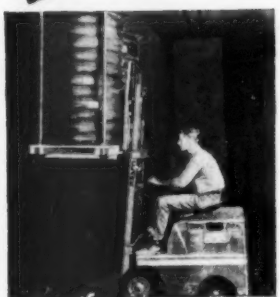
Handle What You Will, CLARK

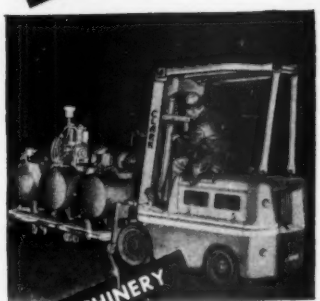


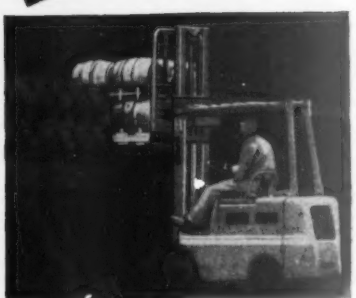












Cuts Your Handling Bill

No matter what you handle, there are three hard-and-fast rules to follow in making a wise and profitable selection of materials-handling equipment:

1. **Choose machines designed and engineered to handle *your* materials—whatever they are.**
2. **Choose machines that will do *your* job at the lowest possible cost.**
3. **Choose machines on which you know you can get prompt and expert service when and where it is needed.**

Adherence to these rules leads straight to CLARK materials-handling equipment, as many hundreds of businesses—large and small—have discovered to their vast benefit.

There are CLARK fork-lift trucks, powered hand trucks, and industrial towing tractors in electric battery-powered, gasoline-powered and, in some cases, in diesel-powered types, designed specifically for *your* job. And if *your* job requires a special attachment, you'll probably find it already in existence and available to you, for CLARK has encountered and mastered handling problems of the most difficult nature in almost every field of industry and commerce.

But if *your* handling is especially tough—if it really is different from any other—CLARK'S proved ingenuity, its long experience and its unrivalled engineering skill are at your service to develop exactly what is needed to do *your* job at the lowest possible cost.

Moreover, CLARK'S nation-wide system of Service Stations manned by Master Servicemen, unmatched by any other, always is as near to you as your telephone.

To learn more about CLARK materials-handling equipment and what it can do for you, fill out the coupon, attach to your business letterhead and drop it into the mail.

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 12, MICHIGAN

Please send: ☐ Material Handling News ☐ Movie Digest ☐ Basic Facts
☐ Please have representative call.

Name_____

Firm Name_____

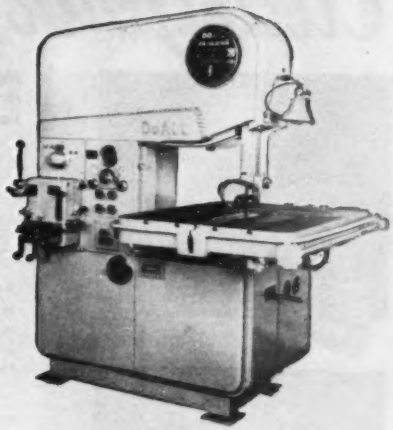
Address_____

City_____ Zone_____ State_____

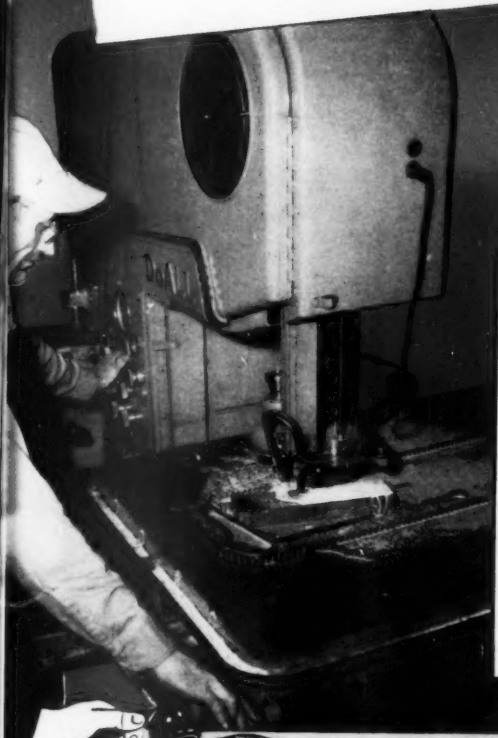
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

YOU CAN BENEFIT FROM

Use the DoALL method for fast low cost machining. Shape and save all types of material. Release larger expensive tools for more profitable operations.



DoALL CONTOUR-MATIC—Finest, most useful band machine built. Variable tool speed 40 to 10,000 feet per minute. Saws, files, polishes, grinds, hones, slices all materials. Hydraulic operation with finger tip controls delivers increased production at lower cost.



BAND TOOLS FOR EVERY PURPOSE

—precision, buttress, claw tooth, spring temper and friction saw bands; line grind, diamond and file bands; scallop edge, spiral edge and knife edge bands; abrasive bands. Ask for catalog.

DoALL'S PAY PRICED AS LOW

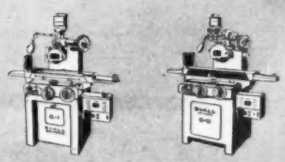
WHATEVER your band machining requirements, you can find the right model in the DoALL line. There are standard machines to meet almost every conceivable requirement: seven frame sizes; five throat sizes; speeds from 40 to 15000 f.p.m.

There is a fixed speed, 16" throat *Utility* bandsawing machine for only $350. There is a combination bandsawing, filing and polishing *Utility* model having a dual variable speed range and attached saw blade welder for only $750—*the biggest bargain available anywhere in a band tooled machine.*

There are the big, high speed DoALL *Zephyr* machines, to handle work loads weighing a ton or more and with Hydro-Feed tables for fast, labor-saving production.

The DoALL *Contour-matic* is unmatched in operational scope, quality of work and productivity.

Call DoALL
SEE YOUR CLASSIFIED PHONE DIRECTORY FOR LOCAL DoALL STORE



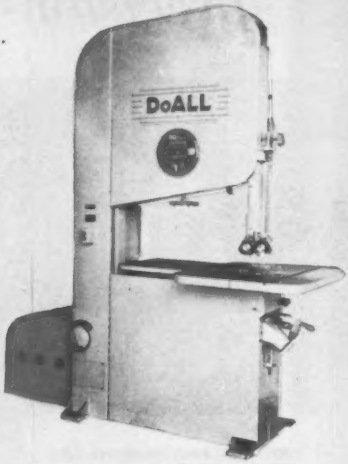
PRECISION SURFACE GRINDERS

GAGE BLOCKS

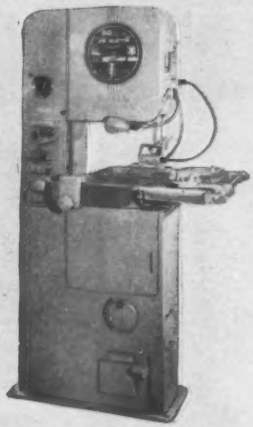
GAGING EQUIPMENT

MOBILE INSPECTION UNIT

DoALL BAND MACHINING!



DoALL "ZEPHYR" MACHINES—For safe high speed sawing, up to 15,000 feet per minute. Widely used for Friction Sawing. Single or variable speed models—16" to 60" throat capacity. Pedal operated or automatic brakes optional on high speed machines.



DoALL CONTOUR MACHINES—For precision bandsawing, filing and polishing in every type of metal working shop. Effortless and precise control of speed and feed result in exceptionally efficient operation and reduced tool cost. Available in 16", 26", 36" or 60" throat capacity with work height under guides as required.

DoALL "UTILITY" MODELS—Light duty low cost bandsawing machines. Fixed speed for plastic or woodworking—variable speeds for more effective and economical metal sawing, filing or polishing. A dual range model combining both high and low speed control is a natural for experimental work on different materials.

IN ANY SHOP . . . AS $350

DoALL *Contour* machines are work horses of the metal shop, handling hundreds of conventional cutting jobs with accuracy and speed.

And, there are special production machines built to order for high output on your special applications.

No matter what your job, there is a DoALL Band Machine to handle it. Call your local DoALL Sales-Service Store or write:

The DoALL Company
254 N. Laurel Ave., Des Plaines, Ill.

"Band Machine Headquarters"

ASK FOR CATALOGS

DoALL

DoALL Mobile demonstration units will bring a DoALL Band Machine right to your plant and demonstrate it on your work. There is no cost or obligation. Simply "Call DoALL" locally, or write to DoALL at Des Plaines, Ill.

8-15

SAW BLADE WELDERS

BAND FILERS

BENCH FILERS

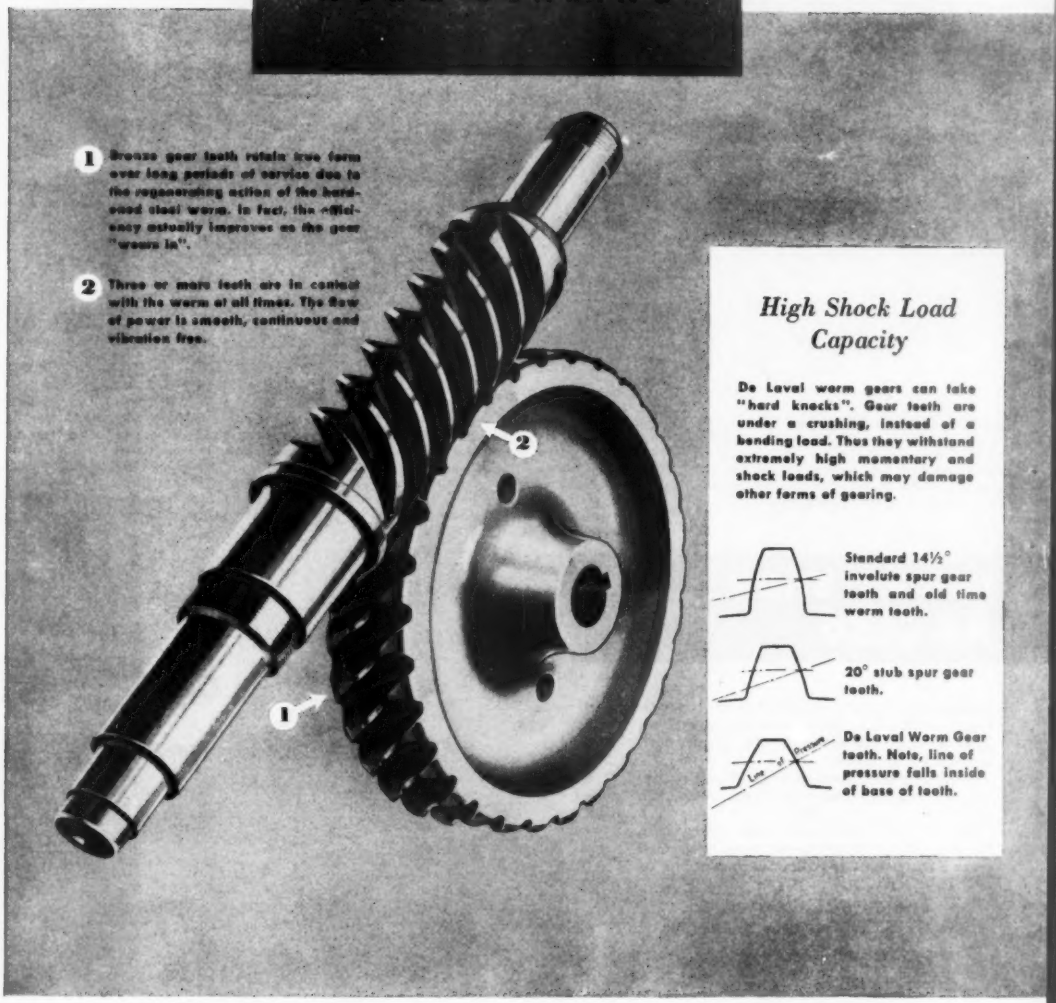
TOOL GRINDERS

TOOLMAKER'S LATHES

TOOL STEEL

DE LAVAL
WORM GEARING

precision-


1 Bronze gear teeth retain true form over long periods of service due to the reconforming action of the hardened steel worm. In fact, the efficiency actually improves as the gear "wears in".
2 Three or more teeth are in contact with the worm at all times. The flow of power is smooth, continuous and vibration free.
1
2

High Shock Load Capacity

De Laval worm gears can take "hard knocks". Gear teeth are under a crushing, instead of a bending load. Thus they withstand extremely high momentary and shock loads, which may damage other forms of gearing.

Standard 14½° involute spur gear teeth and old time worm teeth.

20° stub spur gear teeth.

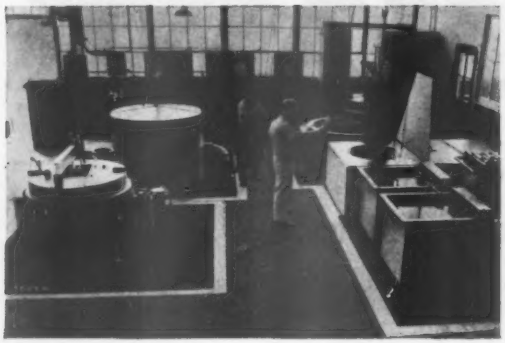
De Laval Worm Gear teeth. Note, line of pressure falls inside of base of teeth.

For high productivity, the machine of the future must perform dependably, without breakdowns, with minimum maintenance. The design features shown above explain why De Laval heavy-duty worm gear speed reducers take punishment year-in, year-out . . . seldom require attention even under the most rugged operating conditions. They make a close-coupled, compact drive. High ratio reduction permits use of efficient, high-speed motors and turbines for driving many types of industrial machinery. De Laval builds all sizes, too . . . from 3″ to 30″ center distances for every type of application. Whatever you manufacture—if you use speed reducers—remember that De Laval Speed Reducers are . . . BUILT TO BE BUILT-INTO A QUALITY PRODUCT.

FREE Easy Selection Manuals

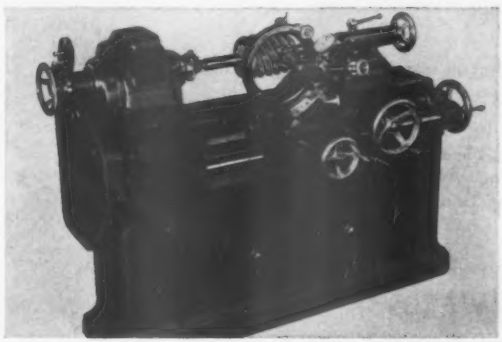
New De Laval Manuals G-WBV and G-WWH place at your fingertips valuable data on single and double reduction units. They contain complete selection data, hp rating tables and outline drawings . . . all set up in easy-to-use form. Write for your copies.

made for the machine of the future



HEAT TREATMENT INCREASES WORM LIFE! Carefully selected alloy steel for worms is surface-hardened and heat-treated in controlled atmosphere, forced convection electric furnaces under modern metallurgical inspection and control. This heat treatment provides hard thread surfaces and most desirable core properties.

PRECISION GRINDING ASSURES ACCURATE THREADS! The most modern thread grinding machines available leave nothing to chance at De Laval. To obtain perfect contact between worm and gear, threads of worm are ground to correct lead and contour, using the master worm as a reference. Thousands of installations have proved these quality standards.



HOBS AND WORMS ARE PRECISION-CHECKED! The profile of the worm thread is compared directly with the master worm on this specially designed machine. This insures smooth, quiet, efficient operation. Use of De Laval master worms results in uniformity, correct thread thickness, precise tooth contour and interchangeability of parts.

GEARS ARE HOBBED BY TANGENTIAL FEED PROCESS! In De Laval gears, the teeth are generated in bronze gear blanks by the tangential feed process, recognized as the most satisfactory method of producing worm gears. Hobs are designed and manufactured by De Laval to secure close control of quality, dimension and form.

DE LAVAL *Speed Reducers*

DE LAVAL STEAM TURBINE COMPANY
Trenton 2, New Jersey

DL-148

Announcing...the BLACKHAWK®

1001 shortcuts to save you time...money... materials in production and maintenance

Here's the greatest collection of ideas ever compiled on new uses for hydraulic tools and hand tools. The IDEA BOOK gives you the benefit of ideas developed and applied by hundreds of users of Blackhawk equipment. Most important, the IDEA BOOK will stimulate you to create *your own* ideas . . . will show how Blackhawk equipment can solve special problems for you! So — *send for it!* You'll want to read every page — you may find a "gold mine" in any *one* picture.

You see, many industrial and construction methods are today being revolutionized by Blackhawk equipment. Savings in time, money and materials are often spectacular. Safety and ease are being introduced to many jobs formerly downright dangerous and back-breaking. Yet Blackhawk equipment itself is surprisingly low in cost!

✓ **IDEA BOOK** shows the way to important savings in Industrial • Construction • Electrical • Mining • Marine • Aviation • Oil • and many other fields.

✓ **IDEA BOOK** points up new methods in Maintenance • Production • Laboratory • Wiring • Field Service • Building • Welding • Inspection • Tool Room Work • Product Application • Weighing-Testing • Safety Engineering.

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in big Idea Contest. Every 90 days Blackhawk will give generous cash awards and citations for the best original ideas using Blackhawk equipment. Get your copy of the IDEA BOOK today for complete details.

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Gauge-equipped jacks

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Hydraulic pipe benders and knockout punches

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HAWK®

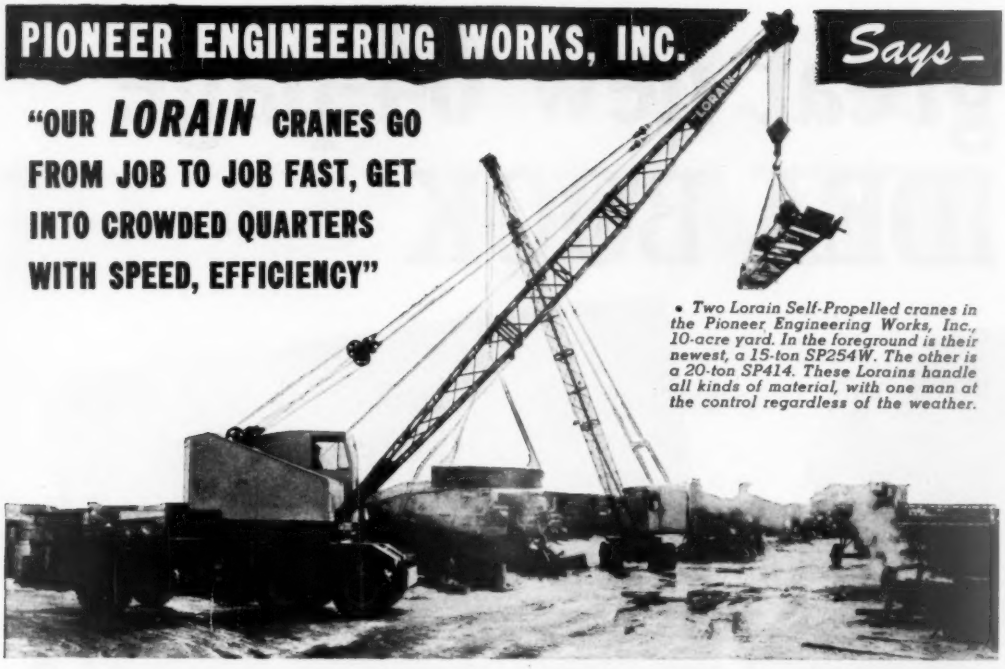
Wrench sets

Torque indicators

Specialized hand tools

PIONEER ENGINEERING WORKS, INC. Says—

"OUR *LORAIN* CRANES GO FROM JOB TO JOB FAST, GET INTO CROWDED QUARTERS WITH SPEED, EFFICIENCY"



• *Two Lorain Self-Propelled cranes in the Pioneer Engineering Works, Inc., 10-acre yard. In the foreground is their newest, a 15-ton SP254W. The other is a 20-ton SP414. These Lorains handle all kinds of material, with one man at the control regardless of the weather.*

At progressive Pioneer Engineering Works, Inc., Minneapolis, Minn., two Lorain Self-Propelled cranes have put storage yard operations on a "mass production" basis. In doing this, Pioneer has solved three problems that apply to material handling in practically every industrial plant. Check these below . . . and, too, check with your Thew-Lorain distributor on how a Lorain can save money, manpower and yard space for you!

HANDLES ASSEMBLY PARTS OR FINISHED PRODUCT...

As shown above, the two Lorain cranes are performing different functions. In the foreground, a large conveyor part is on its way to the *assembly plant.* The other crane is placing a heavy roll crusher base in yard stock for *storage.* Size, shape and weight mean nothing to a Lorain because there are more than 16 lifting attachments for handling any type of material and capacities up to 45 tons.

FAST MOVES...IN A BUSY YARD—CRAMPED QUARTERS

Pioneer shipping foreman — traffic manager, G. W. Lundberg — reports, "Our yard is crowded and busy, the crane goes from job to job fast, gets into cramped quarters without unusual difficulty and handles the loads with speed and efficiency." If you want a fast-moving, time-saving crane for your yard, put a Lorain rubber tire crane to work.

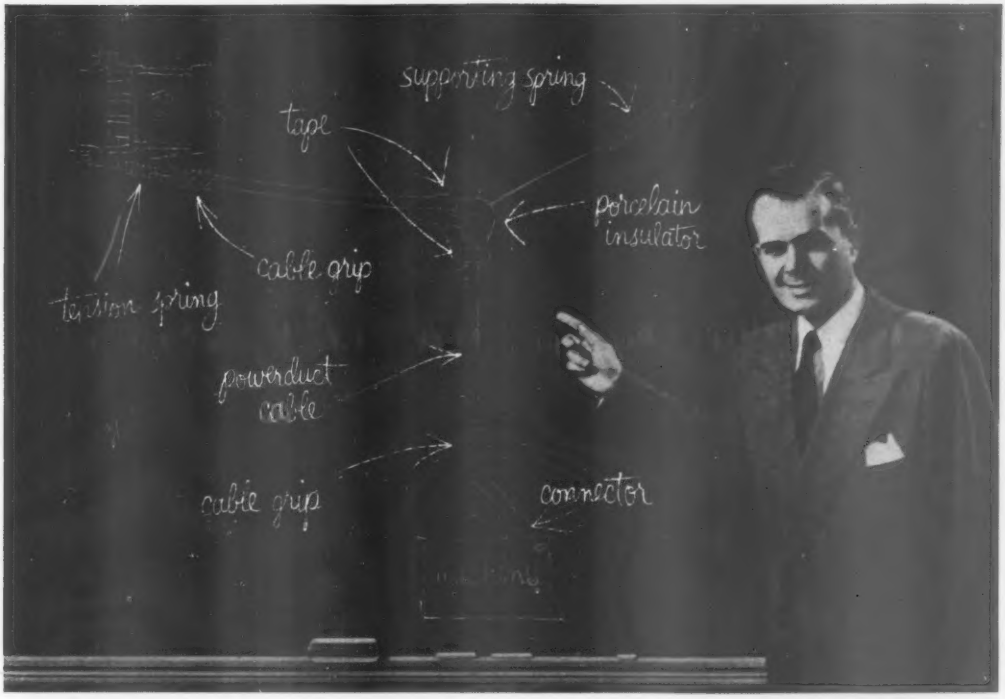
FEWER AISLES . . . MORE STORAGE SPACE . . .

Notice the long booms on these 2 Lorains at Pioneer. Lorain cranes have the lifting capacities to reach high, wide and handsome over stockpiles, lifting and placing heavy loads. As a result, fewer access aisles are needed . . . stock is piled higher . . . valuable storage space is saved.

In addition to Lorains on rubber, you can select from a complete line of crawler mountings to fit your plant needs. Investigate this modern material handling method today!

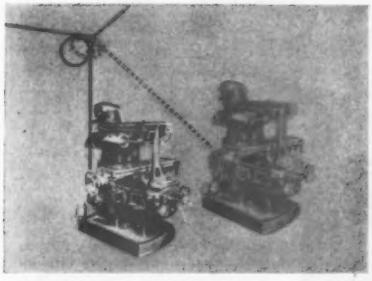
THE THEW SHOVEL CO., LORAIN, OHIO

THEW **LORAIN** ® CRANES FOR INDUSTRY



See how easily flexible Powerduct Cable plugs in. Spring keeps cable taut. For simplicity of installation and relocation, compare this cable with conduit.

No busduct system is truly flexible without this New Powerduct Cable



Mobility of machinery is increased. Powerduct Cable adds to usefulness of many types of equipment.

the right cable for the job

ANACONDA®

wire and cable

It's the only nonmetallic-armored busdrop cable UL approved for this hard use; cuts cost of relocating machines

Your plant may well suffer from hardening of the power arteries. Here's why. Even if you have a modern busduct system, it may be flexible *only so far as it goes.* You may still have to rip out permanent or semi-permanent wiring every time you rearrange important machines. That's costly.

Here's how to remedy this situation. Match your present busduct system with money-saving ANACONDA Powerduct Cable. It's the only cable of its type approved by Underwriters' Laboratories, Inc. for busway branches under section 3646, 1951 National Electric Code.

You save many ways. Powerduct Cable is much cheaper to install than conduit. It handles easily. Grips prevent cable creep. No time is lost. You get circuit capacity at any point for any load at any time. It's a cinch to relocate. Coil (see illustration) makes local changes easy.

How tough is it? Its flame-retardant jacket, woven like a fire hose, takes heavy mechanical abuse, won't fray. Cold-flow is no problem. Cutting compounds, oil, acid, water, grease won't harm it.

Plan now to add flexible Powerduct Cable to your busduct system. See your regular supplier and insist on the ANACONDA Trademark—your positive proof of UL approval for this use. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. A2377

PLAN TOMORROW'S CHARGING ROOM TODAY!

This free 20-page booklet showing efficient, charging room layouts is just what you need to put system into your battery charging operations. It's the latest addition to the vast fund of technical information available to you under the Gould Plus-Performance Plan. Shows how cranes, hoists, battery stands, charging equipment and stations can be located in any size room for maximum efficiency, handling speed and safety. You'll need it tomorrow . . . so send for it TODAY.

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You may be able to save up to 50% on your industrial truck battery costs by using the Gould Plus-Performance Plan. Write Gould Battery Information Headquarters for full information.

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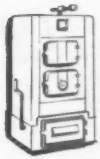
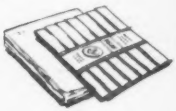
Always Use Gould-National Automobile and Truck Batteries

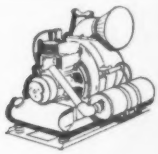


BOILERS



BACON

BOMBS



BLOWERS

BEARINGS

WIREBOUND BOXES AND CRATES

handle them all—from A to Z

Whether your product is large, small, rugged, fragile, heavy or light, it will ship *better, safer* and *more* economically in a Wirebound Container.

Prove it to yourself!

Wirebound
BOXES & CRATES

wood and steel for strength and resiliency

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☐ *I want the A.B.C.'s about Wirebounds. Send a free copy of your booklet, "What to Expect from Wirebound Boxes and Crates."*

☐ *Please have a Wirebound sales engineer give me the facts as they apply to our product.*

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Our Product is _____ It Weighs _____

COST SAVING!

Bunting's 854 sizes of Standard Stock Bearings fit machine tools and industrial machinery of all kinds and are most economical to purchase whether your quantities be large or small.

Bunting's 324 sizes of Bronze Electric Motor Bearings fit practically all popular sizes and makes of motors.

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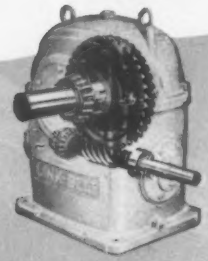
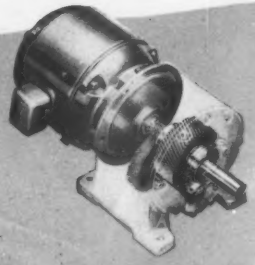
Is your speed reduction problem in this picture?

If it is, LINK-BELT has the right reducer for your requirements



Worm Gear Drive

Reduction ratios: 3.1:1 to 8000:1. Torque: 1400 to 125,000 in. lbs. Output shaft rpm: 0.22 to 564. Drawing shows motorized P.I.V. variable speed and worm gear drives direct-coupled.



Gearmotor

Reduction ratios: 6.2:1 to 292:1. Hp range: 1 to 30. Output shaft rpm: 6 to 280. Drawing at top of page shows gearmotor with roller chain drive.

Herringbone Gear Drive

Reduction ratios: 2.84:1 to 318:1. Hp range: ½ to 1000. Output shaft rpm: 2 to 600. Drawing at top of page shows motor with herringbone gear drive and roller chain drive.

Yes, LINK-BELT builds all 3

HELICAL, Herringbone or Worm gear drive — Link-Belt builds them all. And all are made in the widest range of hp ratings and reduction ratios. Truly a specific drive for every reduction problem.

All of this enables the Link-Belt power transmission engineer to recommend the *one* drive best suited to your requirements. And you can be equally sure that every Link-Belt drive is precision engineered for quiet, economical, long-life service.

Call the Link-Belt office near you for engineering information on any or all of these enclosed gear drives. Send for catalogs.

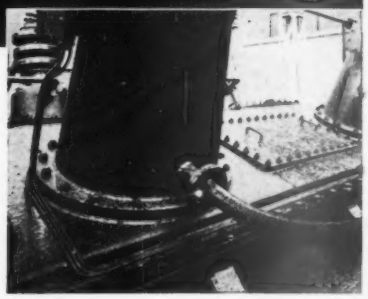
LINK-BELT

ENCLOSED GEAR DRIVES

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,001

What do you mean, it CAN

Well...



Safety m.i. Wiring* in exposed installation on outdoor transformer bank.

SAFETY
MINERAL m.i. INSULATED
WIRING
PYROTENAX ®
A GENERAL CABLE PRODUCT

*Exclusively a General Cable Product.

TAKE ABUSE?

. . SAFETY (m.i.) WIRING

can be hammered, crushed, bent, twisted, jerked —with no impairment of its electrical performance.

Emergency overloads can't hurt it. Age causes no deterioration. It will outlast the structure in which it is installed!

and... **ONE STEP INSTALLATION!**

No additional mechanical protection required. Safety m.i. Wiring is its own conduit. Available fittings permit installation in one operation, using standard switch and standard junction boxes. Smaller diameter provides reserve space and assures neat appearance...

and... **NO VAPOR PASSAGE!**

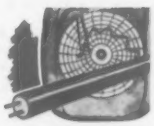
Completely filled with compacted mineral insulation. Necessity for specially installed seals in the cable-run to prevent the passage of combustible gases through a wiring system is wholly unnecessary with Safety m.i. Wiring...

and... **COMPLETELY MOISTURE PROOF!**

Simple fittings permanently seal both ends of each run of wiring. No possible entrance for moisture. Normal concern over this hazard is thereby completely eliminated...

and... **RIGID YET FLEXIBLE!**

Thumb-pressure bending, in ordinary sizes, easily fashions orderly wall patterns—conforms wiring to any contour. Once formed, and fastened with standard clamps or straps, it stays put...



and... **NO HEAT DETERIORATION!**

The mineral insulation is physically stable up to 2800° C., thereby assuring against deterioration by heat, even beyond the melting point (1083° C.) of the copper sheath.

Your General Cable representative is well qualified to discuss the important advantages New Safety m.i. Wiring offers to all industry—for all applications from 0-600 volts. Contact the nearest General Cable office.

GENERAL CABLE
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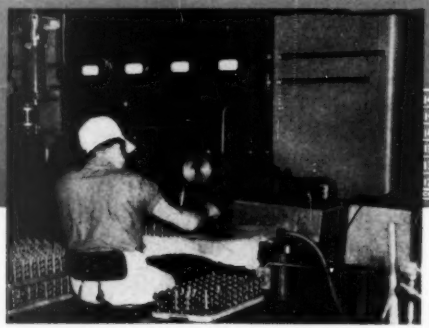
EXECUTIVE OFFICES: 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK SALES OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

"More Power to You"

Why MAYTAG uses RF HEATING for BETTER, FASTER, CHEAPER PRODUCTION



● The Maytag Company has found, for fast production at low cost and high quality, Westinghouse RF Heating installations are the answer.

The installation of a process using two 20 KW-450 generators—for both spline and straight shaft hardening—has paid for itself in *less than 3 months!* This was shortly after World War II, and since then continued use has piled up real profit in savings.

In building a new plant for production of a completely new line of automatic washing machines, Maytag turned to induction heating for brazing and hardening . . . and they specified Westinghouse. A 50 KW and 10 KW RF generator, with associated work handling equipment, are now accounting for still further savings and continued high quality. That's why Maytag says that not only is the Westinghouse RF process the best method for heat treating production parts, but, also, "it produces precision work at the price of rough and ready work."

As we helped Maytag, let us help you solve your problems of increased production at low cost and with high quality. By all means, investigate the possibilities of installing Westinghouse RF Heating.

Westinghouse Electric Corporation
Department F-41
2519 Wilkens Avenue · Baltimore 3, Maryland

Send me your informative case history booklet on induction heating.

Name .....

Company .....

Street .....

City ..... Zone ..... State .....

J-02341

Westinghouse

INDUCTION HEATING

Here's Food for Thought From . . .

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In-Plant Feeding Cuts Absenteeism up to 50%*

REQUIRED READING IF YOU EMPLOY 100 WORKERS OR MORE

THIS NEW, FACTUAL BOOK tells you how it's done!

Tells You What In-Plant Feeding Can Do For You. How to Cut Food Preparation Costs.

How to Choose Equipment for Greatest Economy. How to Establish a Food Service Policy.

How to Lay Out Facility for Greatest Space Savings. How to Assign Responsibilities.

*Based on Surveys by the International Labor Office

IN-PLANT FEEDING has proved conclusively its ability to cut absenteeism, reduce labor turnover, step up worker energy output.

This new book by C. W. Schroeder, outstanding Food Service Engineer, shows you how to use this important new production tool for maximum results. Written in clear, concise terms, you'll find it carries you through, step-by-step, to vital conclusions.

Request your copy of "IN-PLANT FEEDING, *Newest Production Tool for Industry.*" Sent to you without cost or obligation as a contribution to greater industrial efficiency from Hotpoint.

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Only P&H AC Welders have this feature

for faster, easier, sounder welds on non-ferrous and "hard-to-weld" metals

No other welder has this Instantaneous Control feature. Foot-operated, the control provides the heat you call for instantly, *electrically* — not mechanically. No time lag. It's a P&H exclusive that boosts production, cuts costs, saves time.

Inert Gas Welding

Instantaneous control lets you handle "hard-to-weld" metals with ease — aluminum, magnesium, brass, copper, stainless, high carbon, high alloy, and low carbon steels. You get sound welds — X-ray quality every time. No burn-throughs, fewer rejections.

Operators like it, too. It gives them faster, better welds in only five simple steps. Check them:

1. Foot switch automatically turns on power, high frequency, water and gas.
2. Arch starts *instantly* without touching work.
3. Foot switch control provides exact heat needed *while* welding — *no time lag.*
4. Foot-operated control cuts power either gradually or instantly at completion of weld. Eliminates craters — no scrap pieces needed to run out bead.
5. Gas and water shut off automatically according to pre-set time delay.

Compare AC Inert Gas Welders, point by point, and you'll buy P&H. Check these outstanding features:

- **P&H Dial-lectric Control** — No moving coils or cores to bind or freeze. Maintenance is absolutely negligible.
- **Built-in high frequency unit** — eliminates additional external equipment. Variable frequency control.
- **Automatic gas and water control** — Pre-set automatic time delay control (2 seconds to 2 minutes) prevents electrode contamination, assures clean, sound welds.
- **Stepless amperage regulation** — from 10 amps to maximum. Three models available — ranges 200, 300 and 500 amps.
- **Unusual arc stability** — Makes good clean welds where extremely low amperages are required.
- **Selector switch** — gives operator instant choice of standard or high frequency unit.

No wonder P&H Inert Gas Welders are the choice of the aircraft industries where top quality work and speed are "musts". They join "hard-to-weld" metals faster and easier — eliminate rejects for you, too. Get full details from your P&H representative or write us for further information.

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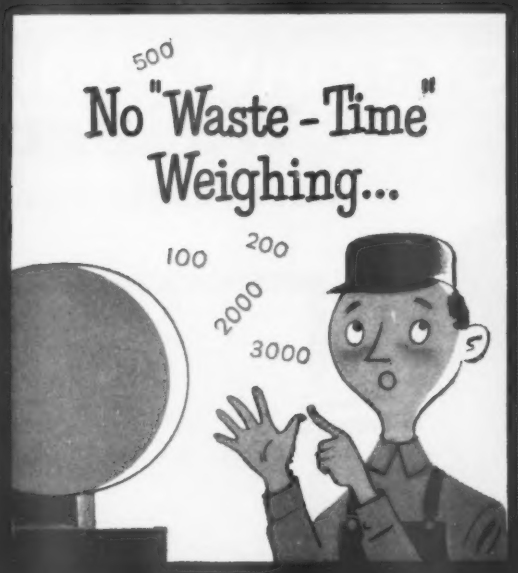


No "Waste-Time" Weighing...

WITH

FAIRBANKS-MORSE

You speed your weighing operations with Fairbanks-Morse Bench Dial Scales. And that means there are no "bottlenecks" to hold up production all through your plant. Here's why:

With Fairbanks-Morse Bench Dial Scales, weights are read right at the point of the indicator. No time-wasting mental calculations are needed. You can weigh as fast as material can be moved on and off the scale platform. And, easy-to-read charts plus elimination of mental calculations reduce the possibility of human error . . . stop profit-eating weighing losses.

To eliminate "waste time" weighing in your operations, consult your Fairbanks-Morse weighing expert. Or, if you prefer, write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

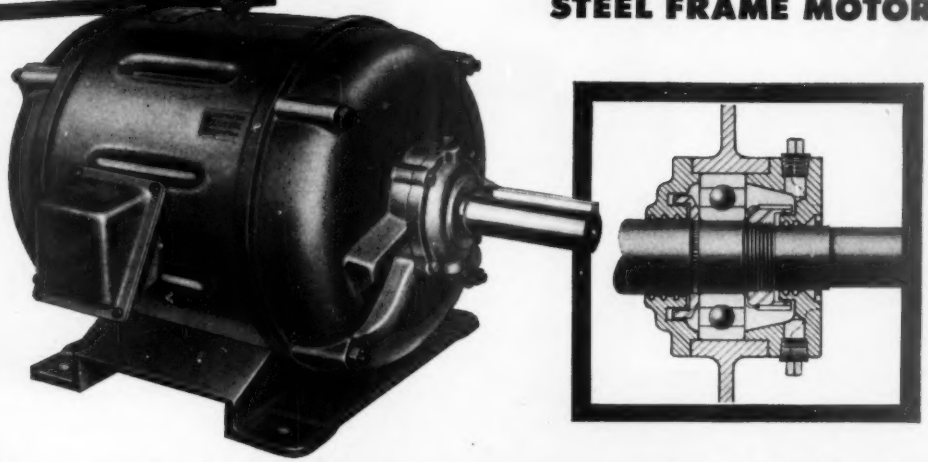
FAIRBANKS-MORSE,

a name worth remembering

SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS
HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

Wagner
STEEL FRAME MOTORS



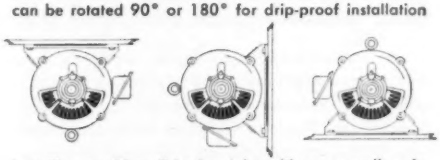
This sealed-bearing motor can be lubricated

Wagner Steel-Frame general purpose polyphase motors are equipped with labyrinth sealed bearing housings that effectively prevent the entrance of any dirt or grit that might cause premature wear. It is not necessary to lubricate the bearings—motors in the smaller frame sizes operate for years without relubrication. But... these Wagner Motors are provided with two lubrication openings — you *can* lubricate your motors when necessary or desirable, to add years of useful motor life in unusually severe applications.

Wagner's Bulletin MU-131 gives valuable information concerning proper lubrication of electric motors — Copies will be sent you on request.

DRIP-PROOF... 3 WAYS

These open-type motors (in frames 326 and smaller) are completely drip-proof in any horizontal position because there are no openings in the frame and the end-plates can be rotated 90° or 180° for drip-proof installation



in ceiling or sidewall horizontal positions, as well as in the normal horizontal position.

Wagner Steel-Frame Motors are available in electrical types to meet most industrial requirements. Bulletin MU-185 gives full information—write for your copy.

WAGNER ELECTRIC CORPORATION
6412 Plymouth Ave., St. Louis 14, Mo., U.S.A.

®Wagner Electric Corporation EST. 1891

ELECTRIC MOTORS · TRANSFORMERS · INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

M52-17

HERE'S WHERE YOU START...

TO GET LOWER MATERIALS HANDLING COST...

These are facts that should interest every manufacturer:

1.—More than 30 percent of the cost of the average manufactured product comes from handling expenses.

2.—Handling adds nothing to the value of the product.

3.—Reducing handling costs is the one way to lower product costs without sacrificing quality.

4.—Four out of five plants could further reduce handling costs.

5.—The Powell representative is a material handling expert who will be happy to work with you in developing the most efficient handling system possible.

There are Powell representatives serving the 54 largest industrial areas in the nation. For the name of the one nearest you check the yellow pages in your phone book or write direct. He'll be happy to give you the benefit of his wide experience with no obligation whatsoever.

POWELL
PRESSED STEEL
SINCE 1920

THE POWELL PRESSED STEEL CO., HUBBARD, OHIO
ORIGINATORS OF ALL STEEL COLD FORMED MATERIALS HANDLING EQUIPMENT
(In Greater Youngstown)
Dept. 172

How would YOU control costs here?

POSITIVE BRAKE-ACTION, so essential to public safety, is aided by use of the Permafuse Corporation's brake-bonding oven. Progressive service stations report the Permafuse oven saves time, labor, and money in fusing the adhesive-coated brake lining evenly and permanently to the brake shoe. A simple THERMOSWITCH® unit provides the constant temperature control for proper bonding.

PREVENTION OF SPOILAGE in refrigeration applications can be assured for little cost. In the Jewett Hospital Blood Bank, for example, the temperature is maintained at 37° within plus or minus 2 degrees. Two inexpensive Fenwal THERMOSWITCH thermostats serve as an alarm signal, warning instantly against freezing or refrigeration failure if temperature goes below 32° F or above 48° F.

A FENWAL THERMOSWITCH CONTROL may cut your costs, too. Its external, single-metal shell expands or contracts *instantly* with temperature changes, making or breaking enclosed electrical contacts. Compact, highly resistant to shock and vibration, Fenwal THERMOSWITCH units have solved hundreds of problems.

SEND FOR THIS CATALOG for complete explanation of the unique THERMOSWITCH unit. Also ask for more detailed, illustrated discussions of the problems above. Fenwal engineers will be glad to help you solve your temperature control problems involving heat, humidity, radiant heat, pressure and other variables. Write Fenwal, Incorporated, 67 Pleasant Street, Ashland, Massachusetts.

Fenwal

THERMOSWITCH®

Electric Temperature Control and Detection Devices

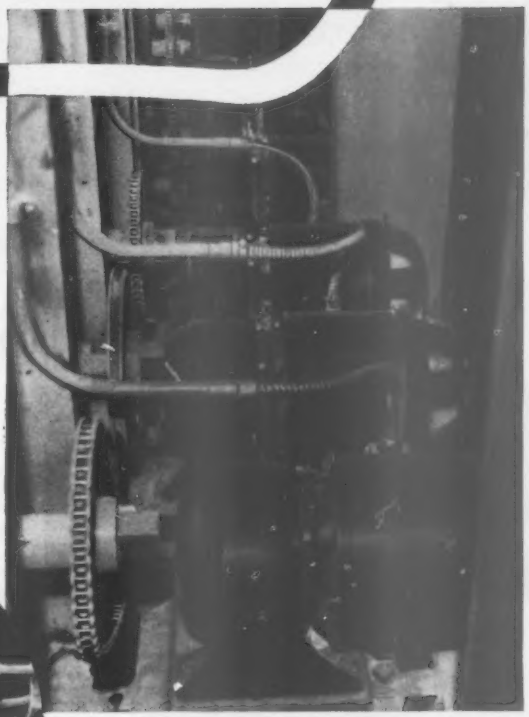
SENSITIVE... *but only to heat*

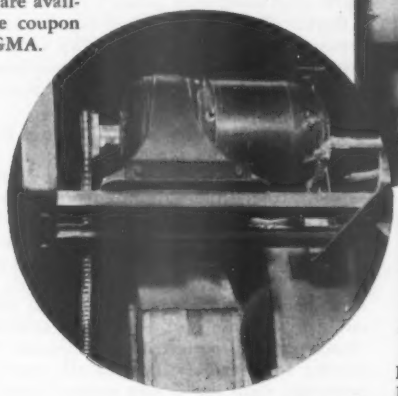
engineered for tough jobs ideal for ANY job

Here is a battery of Foote Bros.-Louis Allis Gearmotors at work for the International Milling Company in Detroit. Enduring heavy loads under excessive dust conditions, these units are providing positive, uniform power, day in and day out, under rugged service.

These Gearmotors incorporate Duti-Rated Gears with file hard surfaces and resilient cores, assuring maximum strength in minimum size. The cast iron housings give rigidity, and the large oil reservoir with splash lubrication means continuous, trouble-free operation.

Foote Bros.-Louis Allis Gearmotors are available in single, double and triple reductions to provide output speeds of 780 down to 7.5 r.p.m. Capacities from 1 h.p. through 150 h.p. Open drip-proof, splash-proof, enclosed and explosion-proof motors are available. Mail the coupon for Bulletin GMA.





Foote Bros.-Louis Allis Gearmotors installed at the International Milling Company, Detroit, Michigan.

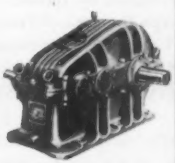
FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. I, 4545 S. Western Blvd. • Chicago 9, Illinois

Line-O-Power Drives

Hygrade Drives



Maxi-Power Drives

Foote Bros. Gear and Machine Corporation
Dept. I, 4545 South Western Boulevard
Chicago 9, Illinois

Send me Bulletin GMA on
Foote Bros.-Louis Allis Gearmotors.

Name.....

Company.....

Position.....

Company Address.....

City.....*Zone*.....*State*.....

INTEROFFICE CORRESPONDENCE

FROM: E. C. Hodges

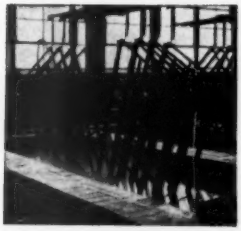
TO: P. A. Nichols

Phil:

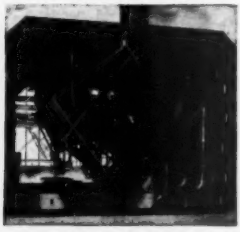
See attached ad on saving thousands of dollars by eliminating window painting with Fenestra Super Hot-Dip Galvanized Steel Windows...Check for the new plant...

Thanks, *E.*

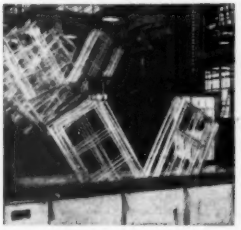
Now You Can Eliminate Maintenance Painting!



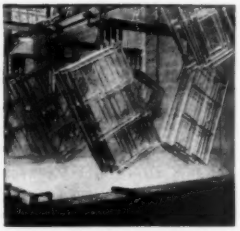
FLUXING. After cleaning, pickling and rinsing, Fenestra Windows dip into a flux bath that provides a film to prevent contamination of the cleaned steel as it passes to galvanizing tank.



DRYING. In this oven, the flux is dried on. Of course, in the galvanizing tank, this protective coat of flux volatilizes on contact with the molten zinc to permit a strong zinc-iron bond.



GALVANIZING. Assemblies dip deep into molten zinc, and come up with a heavy, smooth, uniform coating. Temperature and timing are automatically controlled with laboratory accuracy.



BONDERIZING. Here you see the galvanized assemblies being Bonderized to give the surface a soft silver color and to provide a holding surface for decorative paint, if it is ever desired.

Here's why it will pay you to check, too:

A window painting bill for a typical plant can run around $3,000 every few years.

The most practical answer to that—and any other window problem—is Fenestra* Super Hot-Dip Galvanized Steel Windows. They are rugged, rigid—and completely protected from rust.

Here's why they are called *Super* Galvanized: Fenestra has developed a Hot-Dip Galvanizing system designed specifically for steel windows, and has built a special plant around it. It is the only one of its kind in America.

Completely automatic controls move Fenestra window assemblies through a series of special tanks where they are cleaned and pickled, rinsed, fluxed, dried, galvanized and Bonderized. Every step is laboratory controlled.

So add Super Hot-Dip Galvanizing to other Fenestra advantages . . . such as integral ventilator butts that increase window strength, precision machining of window bars for perfectly uniform window size, automatic assembly of ventilators for perfect fit, continuous double contact for weather tightness all around vent openings, rigid *interlocking* muntin joints.

And, remember, Fenestra's volume production, permitted by standardization of types and sizes, keeps the cost of Fenestra Windows low.

Call your Fenestra Representative or write Detroit Steel Products Company, Dept. FM-7, 2266 East Grand Boulevard, Detroit 11, Mich.

Fenestra SUPER HOT-DIP GALVANIZED STEEL WINDOWS

from America's first plant especially designed to galvanize steel windows

Meet your B-RIGHT-ON *dealer*

Just as you must know your customers' needs . . . he knows yours. He really understands . . . as does every Brighton franchise holder . . . the uses and applications of socket screws . . . and is ready at any time to advise you.

One of his most important functions is to give you prompt service. He's johnny-on-the-spot . . . filling your order from his adequate stock, backed up by centrally located Brighton factory stocks.

He's proud of Brighton Screws . . . they're a real quality line . . . meeting all of your requirements, including the highest standards of strength, accuracy and uniformity.

Make your Brighton dealer a member of your production team . . . get his help on *any* socket screw question. If you're not already acquainted . . . write for his name.

- Socket Set Screws
- Socket Cap Screws
- Socket Head Stripper Bolts
- Socket Pipe Plugs

THE BRIGHTON SCREW & MANUFACTURING CO.

Reading Road opposite Deer Creek

Cincinnati 2, Ohio

QUALITY B-RIGHT-ON PRODUCTS

Order-assembly area at Johnson & Johnson, Chicago. Alternate order-picking aisles are reserved for one-way, two-lane TRUCK-TOW traffic. Fork-lift trucks use other aisles for replenishing stock. Trucks are switched automatically from two-lane traffic to single lane traffic at point A.

Link-Belt TRUCK-TOW helps cut order-assembly manhours 70%!

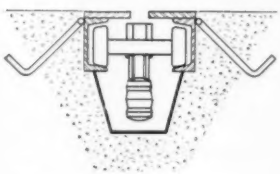
Johnson & Johnson sets new records for speed, safety, efficiency

BY LIMITING manual carrying of merchandise to less than three feet, eliminating confusing cross-traffic, Johnson & Johnson has achieved spectacular savings in its new Chicago shipping center. With the help of two parallel, integrated Link-Belt TRUCK-TOW Conveyors, they have actually *reduced manhours for order-picking by 70%* . . . for overall shipping operations by 35%.

Two parallel conveyor lines through order-picking aisles permit passing and practically double capacity. One line of trucks may be delegated for "slow" picking without hindering trucks on adjacent lane. Special towing masts permit automatic disengagement of truck to suit position of stock pickers. Hinged safety bumpers automatically disengage trucks when obstructed. Steel enclosures around track, trolleys and chain contribute to plant cleanliness.

Many other plants, warehouses and terminals report that TRUCK-TOW offers welcomed savings—not only for order-picking and shipping operations, but for receiving, department-to-department transport and in and out of storage. Whether you need a simple system or one tailored to suit special conditions . . . whenever packaged or bulky items are moved along a regular route, Link-Belt TRUCK-TOW Conveyors can slash your handling costs.

FLOOR TYPE TRUCK-TOW CONVEYOR OFFERS ADVANCED-DESIGN FEATURES



Especially popular where overhead structures interfere with fork-lift truck operation is the Floor-Type TRUCK-TOW. All moving parts are located below the floor.

LINK-BELT

TRUCK-TOW CONVEYORS

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,777

You can't stop a bullet with a catcher's mitt

You can't stop corrosion with ordinary paints . . .

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings. They can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

BECAUSE the six Bitumastic® Protective Coatings, unlike maintenance paints, are specially formulated from a coal-tar pitch base* that is, for all practical purposes, impervious to water. And when you keep moisture away from an exposed surface, you *stop* corrosion.

BECAUSE Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable.

BECAUSE Bitumastic Coatings provide up to 8 times the film thickness of conventional paint coatings.

BECAUSE Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

**Hi-Heat Gray contains heat-resistant metallic base.*

SEND FOR SET OF FREE BOOKLETS!

Koppers Company, Inc.
Tar Products Division
Dept. 753-T, Pittsburgh 19, Pa.

Please send me, without charge or obligation, your booklets on corrosion prevention.

Name.....

Address.....

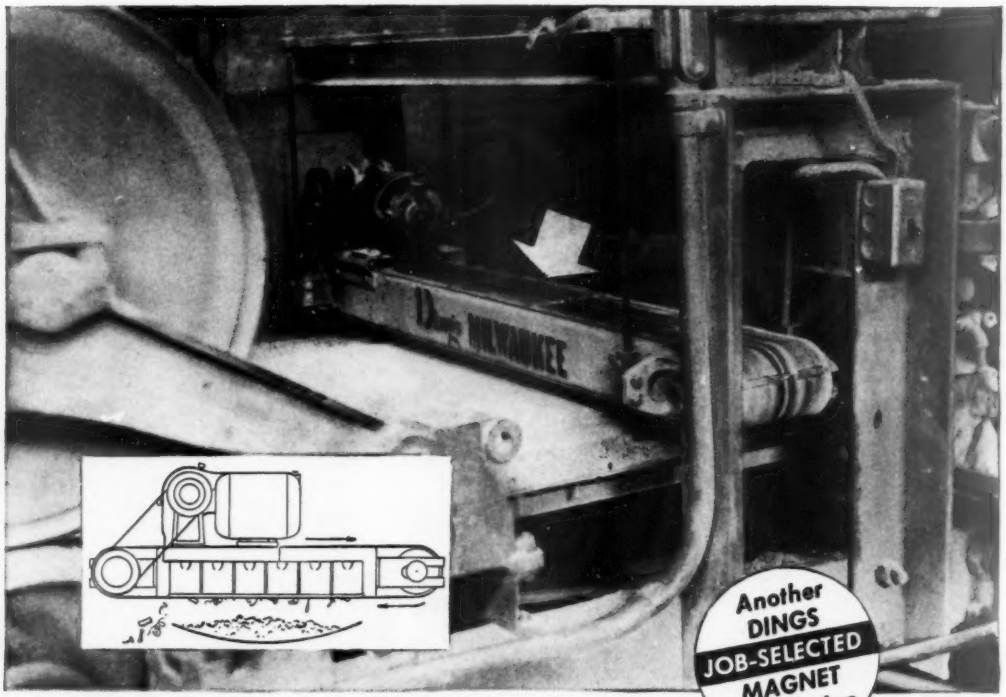
City.....Zone.....State.....

KOPPERS BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, 753-T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.



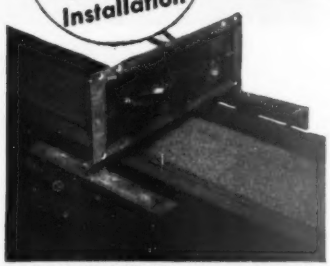
ASBESTOS MINUS IRON EQUALS SALES GOLD

DINGS MAGNETS DO THE SUBTRACTING

HOMEOWNERS like the superior quality of asbestos shingles but if the shingles don't look like wood, they won't buy, says one of the biggest manufacturers of asbestos building materials in the business. So the shingles are passed through engraving rolls to give them the textured appearance of wood. A problem raised by this process and solved by a Dings self-cleaning non-electric Perma-Plate magnet (big illustration) is TRAMP IRON—nuts, bolts, wires, etc. which get in the asbestos during previous processing. This iron would wreck the rolls, alter the pattern and eventually cause rust spots in the installed material. The Perma-Plate gets it all out—automatically.

WHY was the Perma-Plate selected for this job over all other types and styles of magnets in the Dings line? *The specific application dictated its choice.* The magnet was "job selected." Whatever YOUR tramp iron problem, buy a Dings job selected magnet and KNOW it will be successful.

DINGS MAGNETIC SEPARATOR COMPANY
4712 W. Electric Ave., Milwaukee 46, Wis.

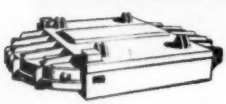


THE PERMA-PLATE (shown here without self-cleaning attachment) is non-electric, permanently magnetic. This magnet is particularly effective where the burden depth does not exceed 3".

THIS CATALOG HELPS YOU TO "JOB SELECT" A MAGNET

Is the material you want de-ironed a solid . . . semi-solid . . . liquid? Is it carried in chutes . . . ducts . . . conveyor belts? Catalog 5000-B lists Dings complete line by application, describes all Dings magnets from the low cost, non-electric "Perma" Plate magnet to the most powerful magnetic separators known. Send for it today.

DINGS MAGNETS

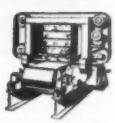


Rectangular

High Intensity Induced Roll

Non-Electric and Electric Pulleys

Non-Electric Drums



High Intensity Type EBK Crossbelt

TROUBLE FREE FOR 15 YEARS handling muriatic acid!

Another 'open and closed' case for

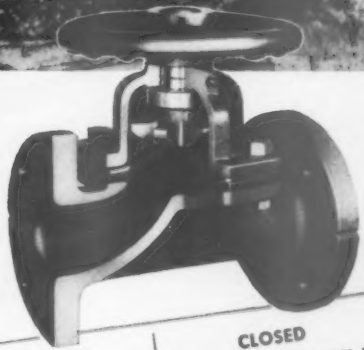
GRINNELL-SAUNDERS DIAPHRAGM VALVES

In 1936, a Canadian mine installed Saunders Diaphragm Valves with rubber linings on the feed and drain piping of an underground tank used for the storage of muriatic acid. Today, after 15 years, those *same* valves are in use—having required no maintenance except for periodic replacement of diaphragms, a simple operation done without removing the valve from the line.

Grinnell-Saunders Diaphragm Valves are available in many different combinations. Bodies are made in a variety of metals —iron, stainless steel, bronze, aluminum and others. ***But of more importance*** is the fact that a body of cast iron (a metal not in short supply) can be lined with glass, lead, natural rubber, neoprene and other materials which, in many instances, handle corrosive fluids *better* than metals.

Diaphragms come in natural rubber, neoprene, butyl, hycar, a special synthetic for foods and KEL-F. This last is chemically inert to all acids and alkalies in all concentrations with the exception of molten alkali metals.

From this broad selection of materials, the problems which the Grinnell-Saunders valve can solve are extremely varied. No wonder industry after industry is putting it on the line.



OPEN

No packing glands to demand attention. Working parts isolated from fluid...sticking, clogging, contamination, corrosion eliminated.

CLOSED

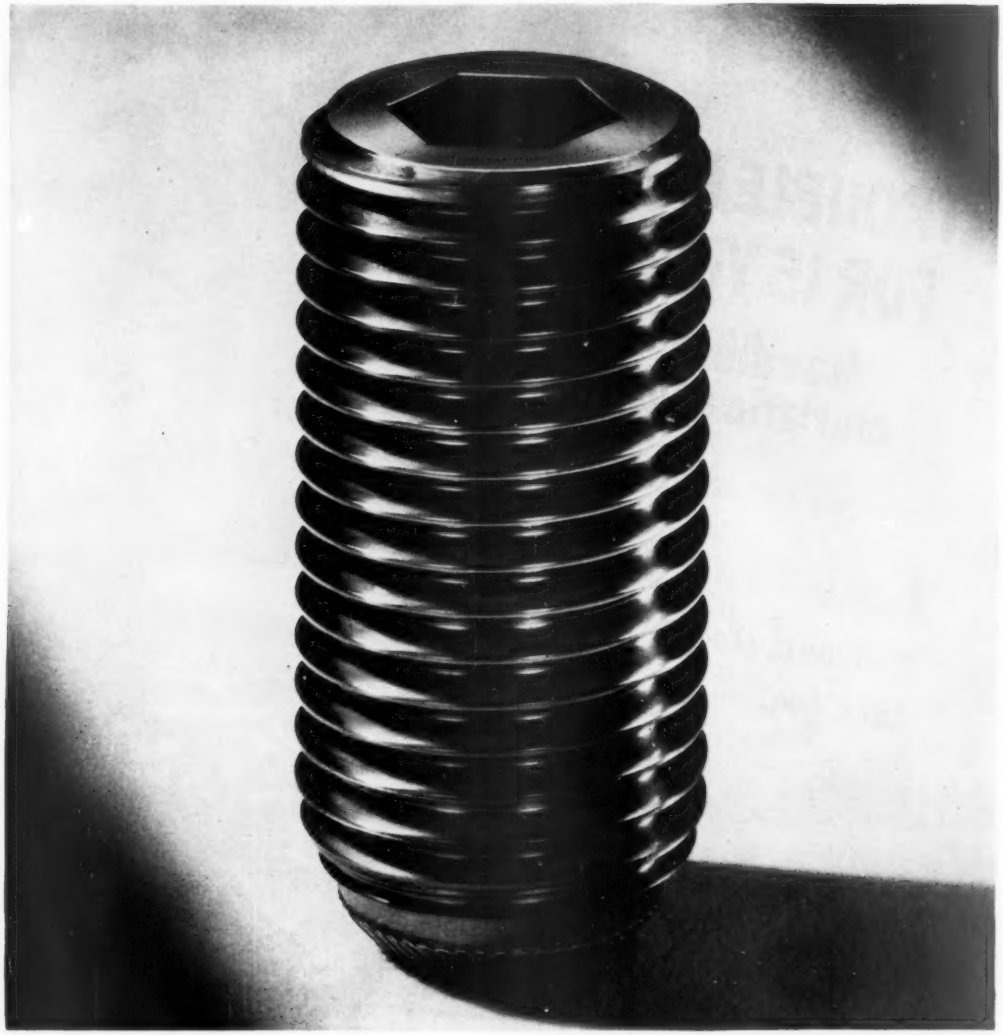
Compressor or finger plate supports the diaphragm in all positions. No metal-to-metal seats to become damaged or wire-drawn.

GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems



For positive, vibration-resistant SELF-LOCKING UNBRAKO SOCKET SET SCREWS

UNBRAKO Self-Locking Socket Set Screws won't work loose. Non-slip internal wrenching provides positive drive. Self-locking feature prevents creep and subsequent loosening. Machinery stoppage and production losses are materially reduced. Write for descriptive literature. STANDARD PRESSED STEEL Co., Jenkintown 11, Pennsylvania.

Standard UNBRAKO *Self-Locking Set Screws, #4 to 1" inclusive, are available from your* UNBRAKO *distributor's stocks. Ask him for your supply of these and other* UNBRAKO *threaded industrial fasteners.*

sps JENKINTOWN, PENNSYLVANIA

UNBRAKO® SOCKET SCREW DIVISION

CAP SCREWS • SET SCREWS • SHOULDER SCREWS • DOWEL PINS • PRESSURE PLUGS

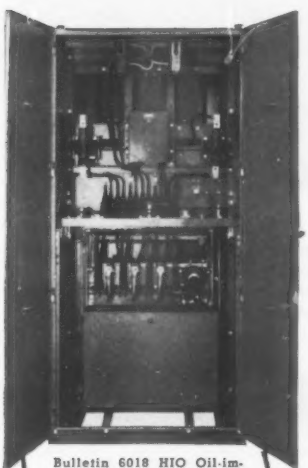
CLARK HIGH VOLTAGE MOTOR STARTERS *insure* COMPLETE *Protection*

Standardized High Voltage Starters with either AIR-BREAK or OIL-IMMERSED line Contactors for *squirrel-cage, synchronous and wound rotor motors up to 700 horsepower. Engineered and built to meet industrial and utility requirements.*

Bulletin 6018 HIA Air Break Starter for Squirrel Cage Motors –front cover removed.

CLARK TYPE HIA AIR-BREAK STARTERS

CLARK High-Voltage Starters with AIR-BREAK heavy duty direct acting Contactors feature 150,000 KVA interrupting capacity disconnecting type fuses (2300 volt, 3 phase, 60 cycle)—overload and undervoltage protection—potential transformer with primary fuses for 220 volt control circuit.



Bulletin 6018 HIO Oil-immersed starter for Squirrel Cage Motors–Rear view with doors open and oil tank lowered, showing contactor.

CLARK TYPE HIO OIL IMMERSED STARTERS

CLARK High-Voltage Starters with OIL-IMMERSED heavy duty direct acting Contactors feature 150,000 KVA interrupting capacity fuses for 2300 volts or 250,000 KVA fuses for 4160/4600 volts (3 phase, 60 cycle)—overload and undervoltage protection—potential transformer with primary fuses for 220 volt control circuit.

All CLARK High-Voltage Starters are enclosed in standardized reinforced steel cubicles with separate compartments for High and Low voltage equipment. Electrically interlocked doors. General Purpose, Semi dust-tight, Weather Resisting and Dust-tight enclosures available.

Please contact us for complete details covering the many features of these standardized High Voltage Starters. Offices in principal cities.

THE CLARK CONTROLLER CO.

ENGINEERED ELECTRICAL CONTROL • 1146 EAST 152ND STREET, CLEVELAND 10, OHIO

HYPRESSURE Jenny STEAM CLEANER

SAVES TIME and EXPENSE IN ANY INDUSTRY

No matter how *special* your cleaning requirements are, Hypressure Jenny steam cleaning provides the fastest, most effective method known for removing dirt, grime, grease, oil, product accumulations, paint, or other substances from your production machinery, floors, walls and equipment. Besides cleaning right down to the bare surface, Jenny sterilizes and deodorizes as it cleans!

You can reduce cleaning time and labor expense 90%, because one man with Jenny can do more cleaning in an hour than 10 men can accomplish in the same time by bucket-brush-and-solvent methods.

In factories, shops, mills, mines, garages, food processing plants, and in many other industries, Jenny is saving up to 40% in man-hours and labor costs by cleaning equipment *before repairs* thus eliminating the non-productive time mechanics must spend fighting oil and grease.

You gain extra productive hours, without added manpower, with Jenny on the job!

We'd like to send you the full story, without obligation. Why not write us today?

HYPRESSURE JENNY DIVISION

HOMESTEAD VALVE MANUFACTURING COMPANY

"Serving Since 1892"

P. O. BOX 86 CORAOPOLIS, PA.

How Gulf Periodic Consultation Service helps plants cut lubrication and maintenance costs

LUBRICANT STORAGE AND HANDLING SIMPLIFIED

You'll find that a Gulf Lubrication Engineer does more than simply recommend the proper oils and greases for every type of equipment in your plant. He offers effective help on every phase of lubrication.

When, for example, he sums up his recommendations of oils and greases, he keeps two things foremost in his mind: (1) the individual requirements of each piece of machinery; (2) the problem of storing and handling lubricants.

He balances these two factors, one against the other, and reduces as far as practical the number and types of lubricants stocked and handled. In one prominent New England manufacturing plant the number was reduced from a total of 26 to 13, which meant a considerable savings in the cost of lubrication. Then too, he'll help you organize your oil house and improve your system of dispensing oils and greases.

For additional information on this cost-saving plan, call in a Gulf Lubrication Engineer today or send the coupon below.

GULF SERVES INDUSTRY

Gulf Oil Corporation · Gulf Refining Company FMM
719 Gulf Building, Pittsburgh 30, Pa.

Please send me, without obligation, a copy of the booklet "Gulf Periodic Consultation Service."

Name.....

Company.....

Title.....

Address.....

Now!

HEAVY-DUTY DAY-BRITE CONSTRUCTION PLUS CFI*

*COMFORT FOR INDUSTRY

These scientifically designed *aperatures* make the difference—give the ideal 10% upward component of light.

. . . the first practical answer to industry's need for comfortable lighting

Number one consideration in industrial lighting has always been rugged, durable construction . . . often at the expense of comfortable illumination. But in the past Day-Brite has consistently demonstrated that highest standards of lighting and highest standards of construction can be combined.

Now, after two years of research and study, we're ready to announce *another* great advance in industrial lighting.

To give industry even more comfortable and vision-saving illumination, Day-Brite has completely redesigned its famous Day-Line industrial line. The new CFI Day-Line is *comfort* engineered to give 10% upward light distribution and put an end to the harsh brightness contrasts and dark ceilings that hamper workers.

Now, workers can enjoy freedom from irritation and nervous fatigue due to eyestrain. Now, management can reap the benefits of more production, less work spoilage, higher employee morale and lower accident rate.

All the familiar Day-Brite features are still there, of course—die-formed heavy gauge steel construction, porcelain enameled reflectors, vibration-proof Turret sockets. And yet, CFI Day-Line prices are actually lower . . . actually mean substantial savings on industrial lighting installations.

See the Day-Brite distributor nearest you. Get the facts about this newest advance in plant lighting. Day-Brite, Inc., 5441 Bulwer Avenue, St. Louis 7, Missouri. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

248

IT'S EASY TO SEE WHEN IT'S "DECIDEDLY BETTER" DAY-BRITE *Lighting Fixtures*

your pulleys will drive your machines only as well as your belts drive your pulleys

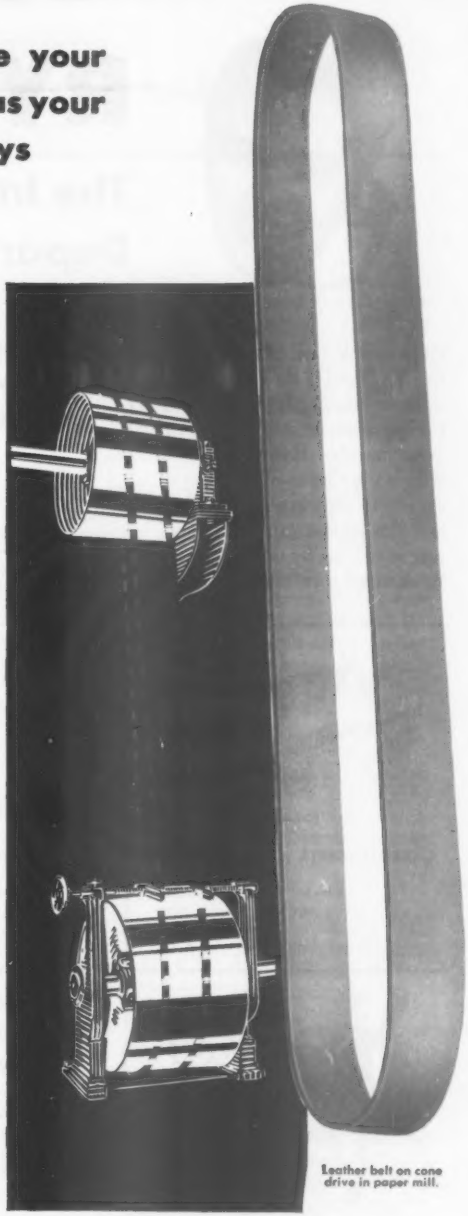
if you want more production get GRATON AND KNIGHT leather belting for more production power

Get a Graton & Knight "Live Traction" Leather Belt — because it is engineered to transmit maximum uniform horsepower at correct speeds and sustained R.P.M. — with ample reserve for load peaks, and "fluid drive action" to absorb starting torque and load shocks.

For tough conditions, cross, shifter and idler drives, **HEART OAK** top grade center stock oak tannage. For short center, small pulley, cone pulley and serpentine *precision* drives, **RESEARCH®** premium quality. For ambient conditions (steam, oil, water, acid and alkali fumes) **SPARTAN®** combination tannage . . . Whatever your conditions, you'll get more production-power with Graton & Knight *Engineered* Leather Belting.

and keep your belts pulling for you
Stop belt slippage — prolong belt life with GRAKO® CLEAR Belt Dressing, result of 100 years experience in leather tanning and belt manufacture. Preserves and lubricates the fibres. Pint, quart and gallon cans—5-gallon and 50-gallon drums. Send for circular.

New Belting Catalog and Manual shows how to get more production-power with leather belting. Our representative will deliver your (free) copy upon request.
GRATON & KNIGHT COMPANY
Worcester 4, Massachusetts



Leather belt on cone drive in paper mill.

second centur **G and K engineered leather belting**
for more production-power
GRATON AND KNIGHT Estab. 1851

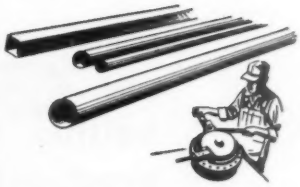
RYERSON

The Industrial P. A.'s Department Store

Here are a few of the many types of steel and related products on hand right now, ready for immediate shipment from your nearby Ryerson plant. Many may be used in place of products that are still hard to get. Check the items you need, and save time by ordering them next time you call Ryerson.

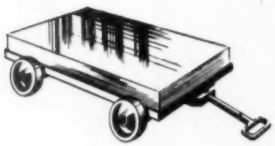
ALLOYS

Tested alloys of known hardenability, both standard and aircraft quality. Complete heat treatment guide with each shipment.



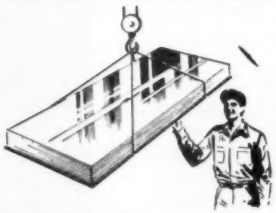
WELDED MECHANICAL TUBING

Hot and cold rolled, rounds and squares in a wide range of sizes. Consider cost. Substitute for seamless tubing.



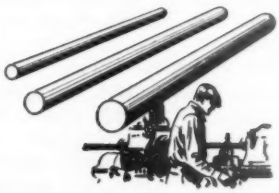
CARBON SHEETS

Both hot and cold rolled coming into better supply, especially cold rolled in the heavier gauges.



STRAIGHT CHROME STAINLESS

No allotment required for these stainless bars, plates and sheets—and they can often replace restricted nickel-bearing types.



TOOL STEEL

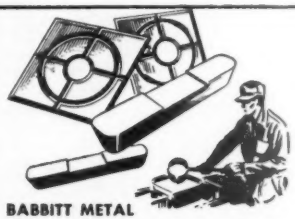
Water, oil or air hardening steel. High in quality; economical in price. Hardening data with every shipment.

SAFETY PLATE

Strong, non-skid Inland 4-Way Safety Plate protects feet against slipping, floors against wear. Easily fabricated.

CHAIN & WIRE ROPE

Rugged, dependable TM chain, iron, steel and alloy qualities, furnished to order. High quality wire rope shipped from large stocks.



BABBITT METAL

Glyco Babbitt, an exclusive Ryerson product, has physicals equal to high tin Babbitts; costs substantially less and is unrestricted.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

There's a bad feeling in labor matters. Inside labor, as well as between labor and management. You can look for more of it in the months ahead. You can see it all around you.

•

Within labor, look at the textile industry. The AFL textile workers are picking up a block of 40,000 or so members from a factional split in the rival CIO union. The fight over other blocks—their contracts and bargaining rights—hasn't yet begun.

In aircraft there's potential trouble between the AFL machinists and CIO auto workers, despite surface unity moves.

In steel the AFL building trades resent CIO moves to cut AFL workers out of construction and repair work.

In electrical manufacturing the powerful AFL electricians are taking on the new CIO electrical workers. This baby union already has its hands full trying to supplant the left-wing electrical union kicked out of CIO in 1949.

•

In relations with management, CIO is especially belligerent right now. Steel is the best example. Philip Murray's bitterness over the industry's refusal to swallow the WSB's recommendations has spread to other unions in CIO.

General Electric is another. IUE-CIO head, James Carey, told a Congressional committee that GE was assisting the communist-dominated rival UE and that this was "very close to treason." GE denied any such thing, of course. But was threatened anyhow with a Congressional "investigation."

Another is rubber. Rubber workers' president, L. S. Buckmaster, accuses some rubber companies of dragging out bargaining and even provoking strikes in an attempt to break up this CIO union.

There's not much management can do about the bad situation. Not unless steel wants to give Murray the union shop. Not unless General Electric takes sides with Carey's IUE-CIO (only to invite trouble with UE). Not unless management gets Congress to lift wage controls and repeal Taft-Hartley. Or persuades Truman to stay in the White House.

For those are the big things the unions want. They see big trouble ahead over the union shop, maybe a law against it from a reactionary Congress. They haven't been able to snuff out the left-wing unions. They see tightening of wage controls and no chance of repealing Taft-Hartley. And they feel the next man in the White House won't be the real "friend" Truman has been.

•

Unions are getting set for tough times, raising huge strike funds. Despite rivalries, the big unions will stick together against big management.

John L. Lewis's offer of $10-million bank credit to support Murray's steel strike was no idle gesture. True, Lewis was playing for headlines with his miners' millions, because Murray's steel workers don't need the money. But it boosted the morale of the steel strikers, stiffened the backs of other workers facing possible strikes.

In a way, too, this gesture by Lewis underscored the bad feeling within organized labor's leadership. Lewis hates Murray and *vice versa*. How better could Lewis, who has waged so many coal strikes without financial help, "show up" Murray than by his grandiose offer of millions?

•

Lewis is responsible for the biggest split in labor's ranks, having started CIO. He is the biggest obstacle to labor unity. Yet he makes the loudest noises about a united labor movement.

The $10-million offer to Murray is the latest of several. They got headlines, that's all.

Last year Lewis invited AFL and CIO to help him raise a $50-million "Labor Defense Fund." Forty AFL and CIO unions each would kick in $1-million. The miners would put up $10-million.

In 1949 Lewis suggested that UMW and nine AFL unions put up $250,000 a week to back Murray's strike for non-contributory pensions in steel.

In 1950 Lewis offered to support UAW-CIO's strike against Chrysler with a $1-million "loan."

Murray can play Lewis's game, too. In the 1949 coal strike he sent Lewis a check for $500,000. It came back, uncashed.

SEE ALSO PRACTICAL LABOR RELATIONS, PAGE 206

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

The steel strike cut industrial production for the second quarter. But it probably means a stronger pick-up as we get into the fall season. We've got to make up lost production.

The loss in steel output, since the strike began June 2, is about 1,850,000 tons a week. That's enough to supply the needs of appliance and kitchen-ware manufacturers for one year.

One week's steel production takes care of a year's supply for agriculture machinery. One week's production would last the railroad equipment industry for four months. It would last the automobile industry for over two months.

•

Slowly, during the last part of June, factories of all kinds were pinched, a few to the point of closing, for lack of steel. Automobile and farm machinery manufacturers seemed especially hard hit on some types of steel. The machine tool industry, with smaller needs and bigger inventory, would probably not be much affected by a steel shutdown until late July.

Anyway you look at it, factories have been chewing up steel on hand to the point where steel is a hard-to-get metal again. Most metals, scarce in 1951, began hitting gluts in the market after spring of this year. One after another, lead, antimony, silver, cadmium, zinc, and steel scrap have shown signs of hitting the price skids. Steel itself was headed for plentiful supply, and maybe lower prices, by fall. But the steel strike has mopped up supplies.

•

Slowdowns, shutdowns, or rescheduling caused by the steel strike are troublesome and costly. And troubles won't end with the strike settlement. It takes time to get back a balanced inventory of steel items.

There'll also be work stoppages in other industries, as other workers strike to catch up to the steel wage pattern. Next there are summer vacations. As if all that were not enough, consumer spending, long uncertain, is in the slack summer buying season, giving little indication of fall demand.

Net result: Factory production is likely to remain off step for most of the summer.

What about the outlook beyond summer? Let's take a look back, first, at how business stood before the steel tangle.

Two powerful forces were spurring the level of production upward. One was mounting defense spending. The other was the high rate of business investment in plant and equipment.

Offsetting this upsurge were two forces pushing production down. One was lower consumer spending for durable goods. The second, more important, force was the heavy cut by businessmen in their rate of inventory buying.

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With these offsetting trends, the economy was, in May of this year, just about in balance. Industrial production, prices, and personal income were all holding level. The steel strike upset this balance in two ways. First, there's pressure again to catch up on production. Second, there's new pressure on costs and prices because of wage demands.

Catching up on output may take three months or so. It probably won't take longer, because some demand for steel products may be lost. The peak of the automobile selling season is summer. To the extent that fewer cars are produced, for lack of steel, sales may actually be lost.

•

Wage increases in steel and other industries are not likely to be inflationary this round. There is real doubt whether increased wage costs can be passed on in prices, at least for long.

You can get the tip-off on this from copper. It's been in tighter supply than steel. Recently the price on Chilean copper was raised, and the Office of Price Stabilization allowed a good share of it to be passed on in prices. But manufacturers did not rush to buy the higher-priced copper, because they did not think their customers would pay the increase. Higher-priced steel could easily hit the very same snag.

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You can look for industrial production to snap back this fall to an index of 222 or 224, compared to an estimated 210 in June. But don't look for new inflation. We're past the period where higher costs mean higher prices.

Squirrel cage motors, slip ring motors, synchronous motors, repulsion induction motors, capacitor motors, direct current motors . . . open, enclosed, splash-proof, fan-cooled, explosion-proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 432 to 1 ratio . . . with electric brakes . . . with mechanical variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best motor drive for YOU

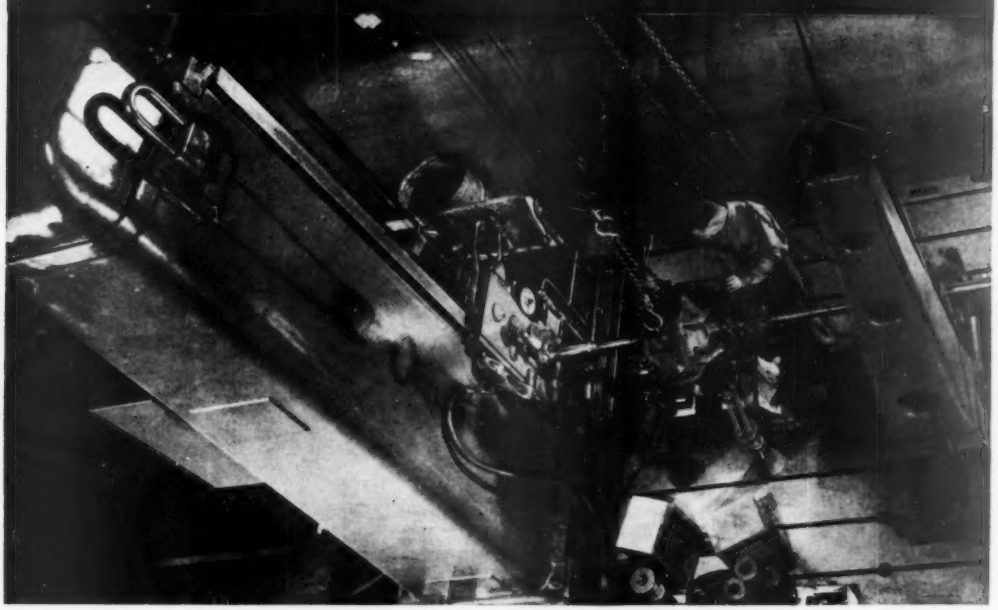
And all of these, the electric motors . . . the electric brakes . . . the gear reduction units . . . the variable speed drives . . . all are designed so they can be easily combined together to give you the RIGHT horsepower, the RIGHT shaft speed, the RIGHT mounting features in one compact power drive.

That's the horsesense way to use horsepower whether you want ⅛ horsepower or 200 horsepower.

THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO

⅛ TO 200
HORSEPOWER

PRODUCE MORE REDUCE COSTS



Use Texaco Lubricants and Texaco Lubrication Engineering Service to help keep your machinery and equipment running at its best . . . with less downtime, less maintenance expense.

Actual records show important savings made and long established preference for Texaco throughout industry. Just two examples out of hundreds—

A manufacturer* in Texas writes: "Texaco has helped us keep output up and costs down *for 37 years.*"

A Chicago plant* saved 147 tool regrinds a month *on just one machine,* by changing to a Texaco Cutting Oil.

In your plant—wherever located or whatever you make—greater production and lower unit costs are bound to follow your use of Texaco Lubricants and Texaco Lubrication Engineering Service—available in all 48 States.

Just call the nearest of the more than 2,000 Texaco Distributing Plants, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

**Name on request*

TEXACO Lubricants, Fuels and Lubrication Engineering Service

Faithfully yours 50 TEXACO STAR *for Fifty Years*

WORK SAMPLING

A new tool to help cut costs, boost production, make decisions

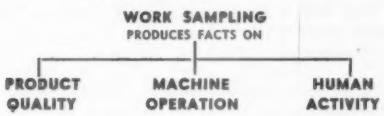
WE PRESENT ON THE NEXT EIGHT PAGES a new concept of a "newish" technique. To be quite accurate, it is a new handle on a proven tool—giving that tool broader usefulness.

We are calling it "Work Sampling." It is a random sampling method of observation to get more information about any activity than it is practical to get by continuous observation. It enables you to get facts without watching everything and everybody all the time. Thus it provides a way:

1. To gather detailed information that it would be clearly impractical to find out by continuous observation;

2. To cut the time and cost of getting "must" information that has traditionally been obtained by continuous observation.

AS WE CONCEIVE IT, Work Sampling's application might be diagramed thus:



The first application is by far the best known and most widely used. It's the basis for statistical quality control.

The second application, to gather data about what machines are doing and why, is used by a handful of companies. The most common name is Ratio Delay (because most of the use has been to find the ratio of various kinds of delays in machine operation to the total time).

The third application, to analyze what people do while at work, is barely in its infancy. The few cases of this application have usually been called Ratio Delay also, because the technique was borrowed from machine-downtime studies.

Many readers have asked us for more information about Ratio Delay as a result of case studies previously published (FACTORY, July 1941, p. 58; October 1948, p. 92; March 1952, p. 136). Our answer is the report on the broadening concept of Work Sampling—given on the following pages by an author who has had much experience in using it.

ONE OF THE GREAT management problems today is the need for more information. As industry has become more complex, it has become harder to get all the facts needed to understand what's happening in the plant and why—to find out where the opportunities for cost-cutting improvements lie.

That is why we think the concept of Work Sampling is so challenging. We feel it will be as important as the concept of work simplification—and indeed Work Sampling can be an important aid to work simplification.

We hope the name Work Sampling will help to interest management in the potential usefulness of the technique. One reason for the success of work simplification has been the name itself—a far better term than motion economy or the like.

FACTORY BELIEVES that Work Sampling has a tremendously useful future for plant management. For instance:

How would you like to know all the facts about how your indirect labor's time is used? Work Sampling is a natural for this situation.

Are you wasting maintenance man-hours because of poor planning and methods? Are there long waits for jobs, unnecessary trips, too many men on some assignments? You can find out by using Work Sampling.

How much does materials handling really cost you? You can use Work Sampling to get *complete* information on the proportion of labor man-hours spent in handling materials.

These are only a few of the uses that you'll think of for Work Sampling, once you get familiar with it. So, for the full story of what it is and how to use it, TURN THE PAGE ——▶

A progressive company tells

How You Can Put Work Sampling to Work

By C. L. BRISLEY • Industrial Engineering Manager, Wolverine Tube Division
Calumet & Hecla Consolidated Copper Company, Inc., Detroit

Wolverine Tube boosted productivity 19% by using this technique to study a major operation.

Here are all the details you need to start from scratch to use this management tool to get more facts about what your men and machines do—and why.

OUR COMPANY HAS BEEN USING a random sampling method of getting facts about machine and human activities—and it has paid off.

We've called the technique "ratio delay"—the name by which it was introduced in this country in 1940 by Professor Robert Lee Morrow of New York University.

Until recently, our use of ratio delay was limited to just what the name implies—finding the causes and ratios of delays.

Those of us who have used ratio delay now see and envision many more uses for this technique. The random observation method applies to any activity that will yield valuable facts about its internal details by continuous observation. Ratio delay actually describes only a part of the broad usefulness of this tool. In Wolverine Tube we sometimes have called it "ratio observation," to indicate the expanded concept of application.

"Work Sampling" is FACTORY's suggestion for a new name for the new concept. We are adopting it at Wolverine, as of now. But to stick to the facts of our past experience, I'll still use "ratio delay" in this article.

We *have* used ratio delay for several years to develop time study allowances.

We *can* use ratio delay—and you can, too—to get facts about any plant activity, to get the facts needed to make cost-cutting improvements, to make decisions, to develop controls.

For instance, in Wolverine Tube one application showed us how to boost the productivity of one process by 19%. Another application is giving us the information with which we can improve our engineering manpower effectiveness.

We could have collected the "what-goes-on" facts by continuous observation. But the ratio delay technique has these advantages:

- Gets the facts at one-third to one-sixth the cost of continuous observation.
- Does *not* require observers with special skill and training.
- Provides the accuracy required.
- Makes it practical to get facts you wouldn't otherwise try to collect.
- Produces fewer complaints than continuous observation from operators under study.
- Produces less distortion than continuous observation in the operator's normal work routine.

WHAT IS RATIO DELAY?

Ratio delay is a method of finding the causes of delays and the ratio of those delays to total time by random observations.

Let's take a simple example to see how it works: Assume we want to find out how much time a selected machine spends on operation, set-up, maintenance, and delay.

Using the ratio-delay technique, we visit the machine a predetermined number of times a day, say 10. That doesn't mean every 48 minutes during an 8-hour day. That wouldn't be *random* sampling. We want 10 random samplings during the day that follow no set pattern. We record which element is occurring at the instant of each visit.

At the end of 10 days the record may read:

	Observations	*Percent of total*
Operation	60	60%
Set-up	18	18
Maintenance	10	10
Delay	12	12
Total	100	100%

The percentage distribution of the various elements, as they occurred during the random observations, tends to equal the exact percentage distribution that would be found by continuous observation.

The key to the accuracy of ratio delay is in the number of observations. A greater number of observations provides a higher degree of accuracy. But nearly all plant problems have a point beyond which greater accuracy of data isn't worth while. In the example, 100 observations may or may not be enough, depending on the accuracy required. Later in this article I'll show you how to judge.

PULL OUT HERE ⟶

WHY DOES RATIO DELAY WORK?

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If you're familiar with the law of probability, you may want to skip this section. But, before you go on to Point 3, take a look at the demonstration chart on this pull-out page. It's an idea that will help you "sell" ratio delay to others, to help them understand it. We've actually used it for that purpose. I don't know of a better way to get the participation and cooperation of the other people concerned with a study.

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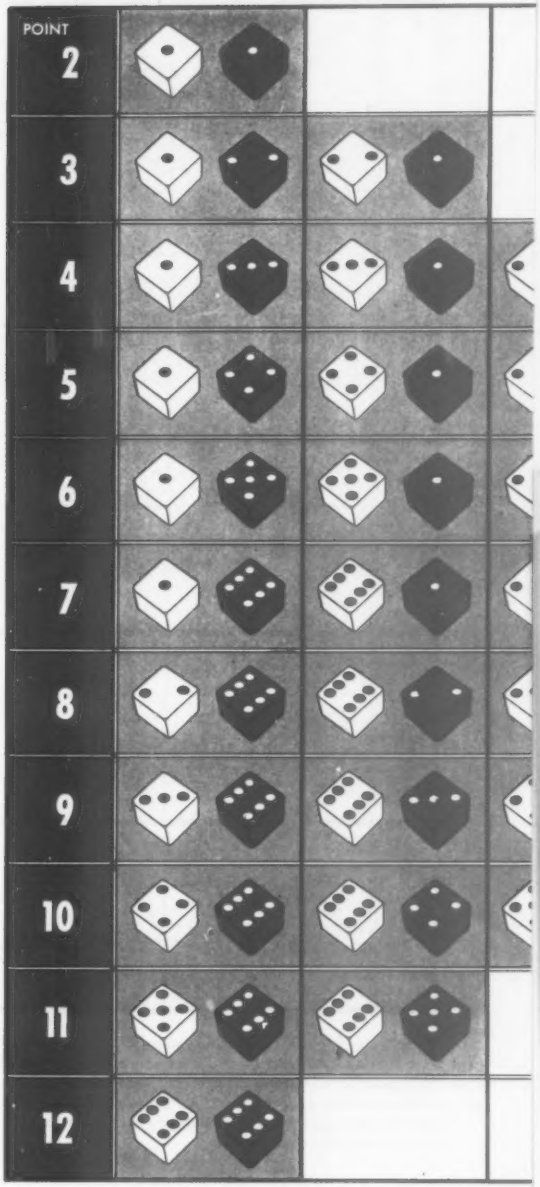
Another example of how the law of probability works is dice throwing. It's a little more complex than coin tossing because one throw of two dice has 36 possible results, instead of 2.

Thirty-six throws will tend to produce one 2, two 3's, three 4's, four 5's, five 6's, six 7's, five 8's, and so on. Note that I said *tends* to produce. Each series of 36 throws won't duplicate the pattern exactly. But the results get closer to the pattern (probability curve) as you increase the number of series of 36 throws. The percentage of error decreases.



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WHERE TO USE RATIO DELAY

Ratio delay has not yet been used on every type of problem for which it's adaptable. But we'll tell you about some example jobs on which it has been used. Then we'll give you our ideas for further application of the method. First, the examples:

IN TIME STUDIES

I mentioned that at Wolverine Tube we use ratio delay to determine time-study allowances.

If you use time standards for any purpose, you generally add allowances to the basic work time for "miscellaneous work" and "necessary delays." The general practice is to make continuous time studies over a period of time long enough to get a typical cross-section of the process conditions. Continuous time study takes a lot of specially trained manpower; but you *must have* factual data to establish reasonable allowances.

Now we get the same data by ratio delay. It requires only a fraction of the man-hours needed to make continuous time studies. Observers require very little training—much less than qualified time study men. Experience has taught all of us that the data are sufficiently accurate.

IN MACHINE UTILIZATION

When our new Decatur, Ala., plant began operating in 1948, it was equipped with the most modern machines. But we had many production problems in the beginning. Inexperience with the new equipment caused some. "Bugs" and needed improvements in the equipment caused others. In fact, we had so many problems we hardly knew where to start.

We needed something to tell us quickly the location, relative magnitude, and causes of our more serious production roadblocks. Experience with finding delays in our Detroit plant by ratio delay suggested using the technique on our new plant problems.

Random observation, instead of continuous observation, permitted us to get the facts about many operations at once. The facts told us where and why we weren't utilizing our potential production capacity. We concentrated our problem-solving attention on the worst cases first, others later. Improved methods, with further ratio delay studies to check progress, pushed production to par in a hurry.

Very important: We trained our supervisors in ratio delay and work simplification when we started the drive. Believe me, that was a good investment of time. Understanding, they cooperated. Knowing how, they developed methods improvements that eliminated delays. Their participation speeded the job of finding facts and answers.

Another Wolverine Tube example shows how we used ratio delay to boost production of a group of machines 19%. But we'll discuss it later in the article because we want to use it to explain the details of a ratio delay study. Now here are ways other companies use ratio delay:

IN CLERICAL OPERATIONS

Carrier Corporation, Syracuse, N. Y., adapted ratio delay to the analysis of clerical work, called it "cycle interruption analysis." The purpose of the study was to find the relative amount of "make-ready," "do," and "put-away" in a clerical operation. One observer can study a large group of clerks simultaneously.

IN WORK ASSIGNMENT

Harper Hospital, Detroit, is not an industrial operation. But when a hospital has a problem of employee work loads and duties it has exactly the same problem that a manufacturer might have. That's why Harper management asked a group of industry executives to study its problem.

A ratio delay study showed that head nurses (supervisors) spent 20% of their time charting, a job for non-supervisors. The study also showed that registered nurses (skilled "operators") spent much time running errands for patients and performing menial tasks.

Reassignment of duties gave the professional work to the nurses, other work to nurses' aides, orderlies, and messengers.

Result: The same force of nurses now cares for more than twice as many patients. They're doing it better, too, according to a survey of patients.

IN WORK SIMPLIFICATION

"Company X," whose identity cannot be disclosed, uses ratio delay to aid in work simplification.

Before anyone can devise a better method for performing an operation he has to have the facts about the present method. Time study data—if he has it—will give him the facts. But Company X's tank fabricating department didn't have time study or any other factual information about production operations.

The company used ratio delay to spot the best opportunities for savings through better methods.

Common work elements were listed and grouped as follows:

1. Make ready (receive instructions; read blueprints; and move materials).
2. Craft work (layout; fit; position; weld; clean weld; burn; grind; and shear).
3. Worker delay (relief periods; interruptions).

Turn the page

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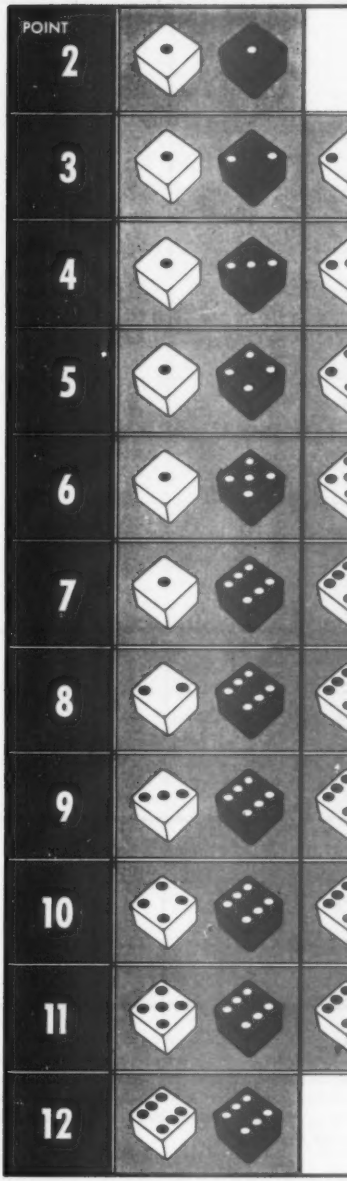

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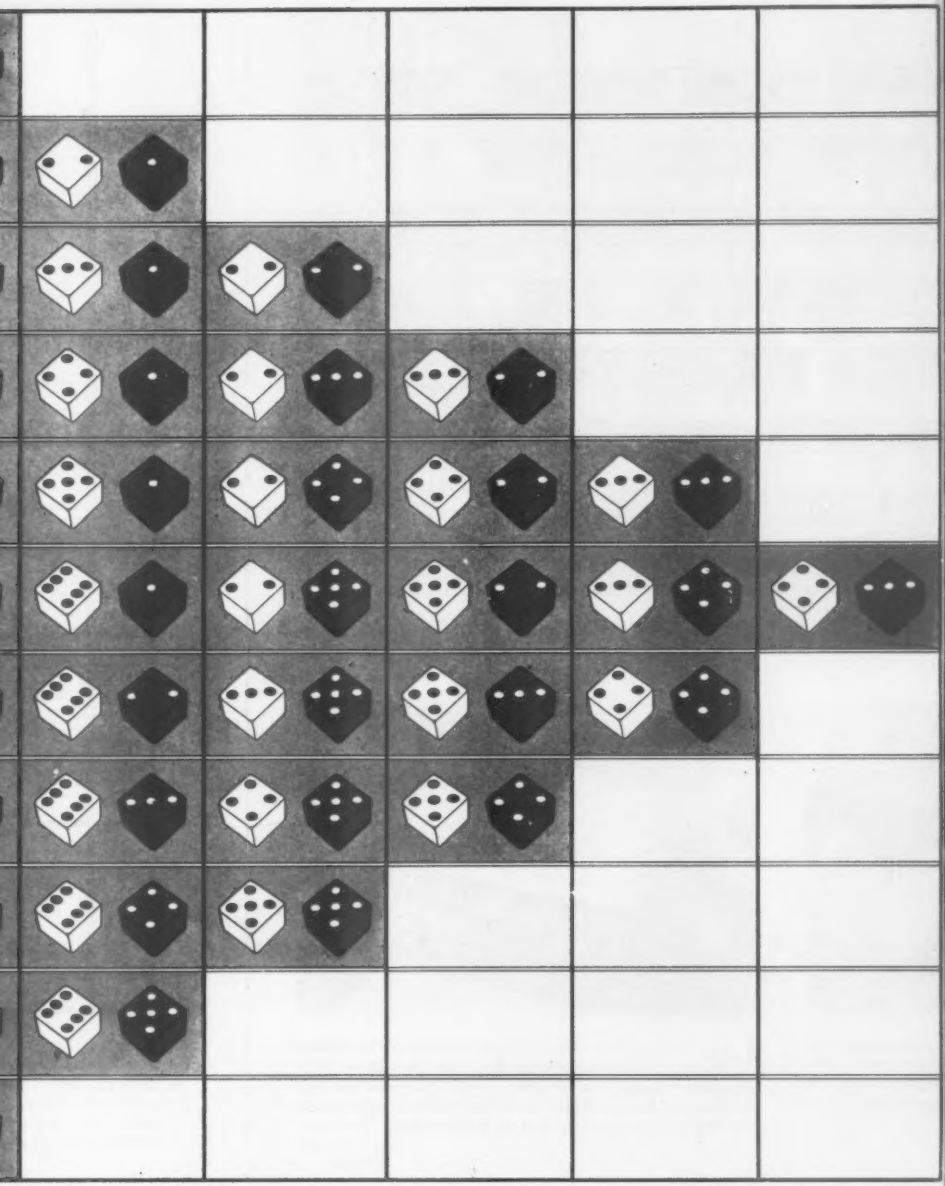


of dice 36 times, the result will die has 6 faces. Each is equally e die. Two dice thrown together rent ways. The scores found by from 2 to 12. But there's only hat produces a 2 — 1 and 1. Two combinations add to 3 — 1 on the first die, 2 on the second; and 2 on the first die, 1 on the second. Three combinations add to 4, four combinations add to 5, and so on.

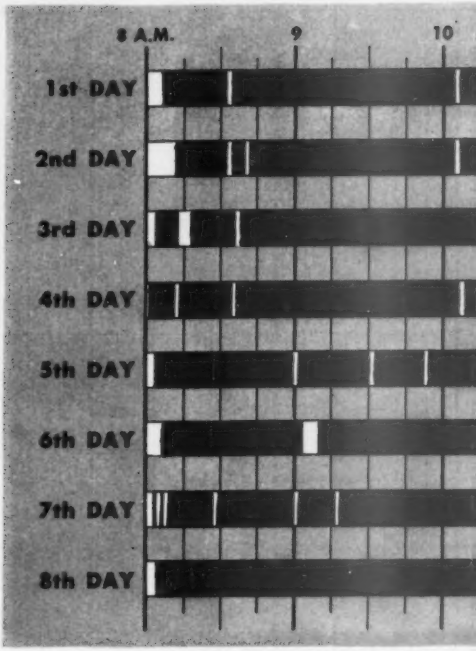
According to the law of probability, 36 consecutive throws of the dice will *tend* to turn up each score the same number of times as the number of possible combinations of that score.

| POINT | | |

3. PROBABILITY APPLIED TO RATIO DELAY

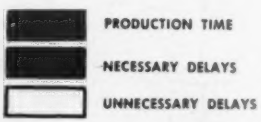
In both examples (coin tosses and dice throws), the law of probability holds that a small number of chance occurrences tends to follow the distribution pattern produced by a larger number of occurrences. Ratio delay works the same way. A small number of observations—taken at random—tends to follow the same pattern of distribution (ratios) as a larger number (the largest number would be continuous observation).

You can make this ratio delay study without leaving your chair. The diagrams on this page will show you how. It will make you an experienced ratio delay observer. That's really all the training you need. Then use the chart to explain the validity of the technique to others in your organization—foremen and workers, or upper management. Also, use it to demonstrate the method to green observers.



1 Plant activity on which to make a ratio delay study could be practically anything controlled by machines or people. The objective of this case-example study was to find the proportions of time a press was in production, stopped by necessary delays, and stopped by unnecessary delays.

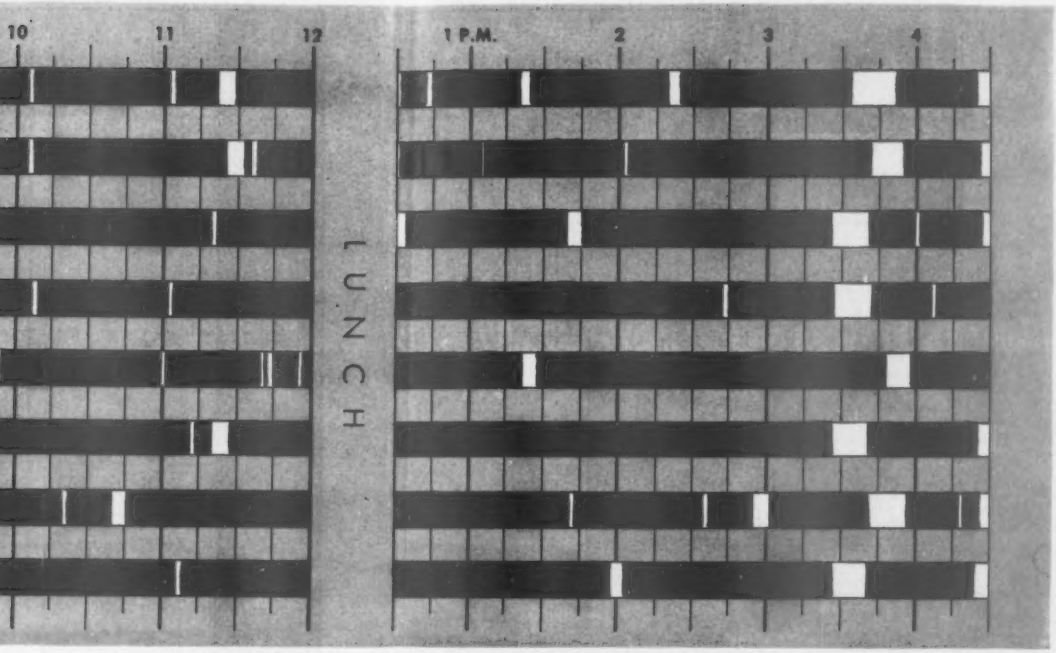
The chart shows the actual time distribution obtained by continuous observation during an 8-day period. Follow the remaining steps for a demonstration of how to short-cut the process of getting this data — by random observation.

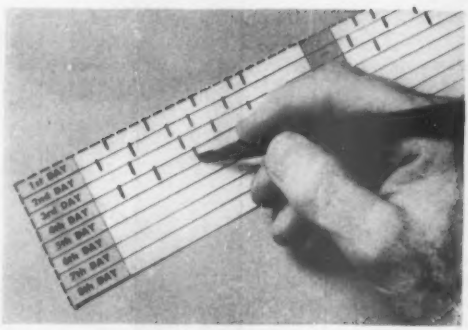


2 Plan the number of daily random observations you think you'll need to learn what's happening. Also, plan the number of days during which you'll observe the operation. For this example study we'll arbitrarily select 10 observations a day for 8 days.

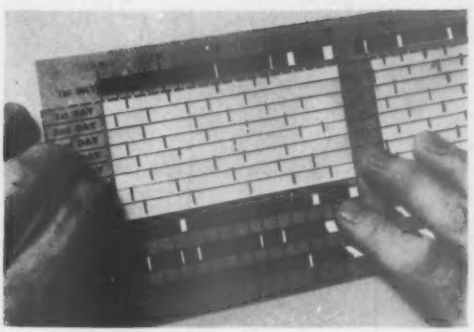
Cut out the "planning" form below. Make sure you cut the ends on the dotted lines. Then cut apart the strips.

1st DAY	
2nd DAY	
3rd DAY	
4th DAY	
5th DAY	
6th DAY	
7th DAY	
8th DAY	





3 Make 10 pencil marks at random intervals across thewidth of each "daily" strip. These simulate the times you would make visits to the machine if you were actually doing a study in the plant. Remember that you want 10 *random* observations a day — not one every 48 minutes, for instance.



4 Place each pencil-marked strip, one at a time, on the distribution bar for the corresponding day in the chart above. Align the ends of the strip with the chart carefully. Note what was happening at the machine at each pencil mark. In effect, you're noting what the machine is doing at the time of observation.

PRODUCTION TIME	1	2	3	4	5	6	7	8	YOUR PERCENTAGE BASED ON TOTAL OF 80 RANDOM OBSERVATIONS	PERCENTAGE UNDER CONTINUOUS OBSERVATION
	9	10	11	12	13	14	15	16		
	17	18	19	20	21	22	23	24		
	25	26	27	28	29	30	31	32		
	33	34	35	36	37	38	39	40		
	41	42	43	44	45	46	47	48		86.7%
	49	50	51	52	53	54	55	56		
	57	58	59	60	61	62	63	64		
	65	66	67	68	69	70	71	72		
	73	74	75	76	77	78	79	80		
NECESSARY	1	2	3	4	5	6	7	8		
	9	10	11	12	13	14	15	16		5.2%
	17	18	19	20	21	22	23	24		
UNNECESSARY	1	2	3	4	5	6	7	8		
	9	10	11	12	13	14	15	16		8.1%
	17	18	19	20	21	22	23	24		

5 Record in the form shown above what you find happening—and be scrupulously honest about it. When a pencil mark on a daily strip points to production time (red), cross out one of the consecutively numbered blocks in the "production time" section of the form, starting with "1" (the numbering in the blocks keeps a running total of occurrences for you). If the pencil mark points to a delay, cross out a block in the appropriate delay section.

6 Calculate percentages of observation distribution, compare with actual time percentages. They'll tend to be equal, according to the law of probability. More observations cut the difference.

Now you'll want to know how to make practical use of this technique and how to apply it. For this information, start reading again on the next page ▶

HOW TO PUT WORK SAMPLING TO WORK

Begins on page 84

4. Shop delay (standing by — waiting for another worker to perform his operation in a group job; walking; equipment delay).

One observer made 3900 random observations during 11 days. He made about 7 trips an hour through the series of operations, but not on a regular schedule. He changed the route and sequence of every trip to get completely random observations.

He found that two elements—*standing by* and *position* — accounted for more than a quarter of the man-hours. So the company concentrated its first methods studies on those two elements. That's usually the best way to get big gains fast.

FOR ELEVATOR TRAFFIC

Eastman Kodak Company, Rochester, N. Y., used ratio delay to study the crowded conditions of elevators. The idea was to find out the extent of the problem and the causes. With the facts Eastman was able to develop ways to lick the problem.

STUDY		DATE		OBSERVER	
ITEM	BENCH NO. A-24	BENCH NO. A-23	BENCH NO. A-22	BENCH NO. A-21	TOTAL
CYCLE	𝍸 𝍸 ||||	𝍸 𝍸 𝍸 𝍸 ||	𝍸 𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 ||||	71
SET UP	/	///		/	5
NOT OPERATING	𝍸 𝍸 |||	//		𝍸 𝍸 ///	30
OPERATOR ABSENT			/		/
OPERATOR IDLE			//		2
POINT – HEAVY					
SMALL					
BENT		/	/		2
JAWS – NOT GRABBING		/			/
NOT RELEASING					
STOCK – TANGLED			/		/
BREAKING			/		/
HANDLING	//	/	//	//	7
WAITING – CRANE	/	/			2
STOCK	/	/		/	3
TAIL IN DIE					
THREADING MANUALLY			/		/
HOOK WON'T ENGAGE					
TUBE RELEASED TOO SOON					
GUIDE TUBE INTO DIE					
MAINTENANCE		/		/	2
ADJUSTING RODS				/	/
CHECKING PINS & DIES				/	/
CLEAN UP	/	/	/		3
REC. INSTRUCTIONS			//		2
					136

OBSERVATION RECORD form for Wolverine Tube's study of drawbenches was designed for the job. Each red mark represents one random observation.

FOR MATERIAL FLOW

Carr, Adams & Collier Company, Dubuque, Iowa, used ratio delay to get a picture of the flow of material in a small-lot operation. The sampling technique was much easier and faster than summarizing the movement from route sheets.

OTHER USES?

At Wolverine Tube we're trying ratio delay on the engineering manpower problem at our Decatur plant. Right now we're making studies of the activities of the engineers—to see if they are doing a lot of non-engineering work. One of the objectives is to find out if one or more clerks can do some of the work that engineers are now performing.

Also, we'll be on the lookout for better methods of engineering procedure. We got the idea for this study from the job done at Harper Hospital.

We don't know where we'll try ratio delay next. But I am sure that we and other plant managements will find it useful wherever we need more facts, and where those facts are difficult and expensive to get by traditional methods.

HOW TO PREPARE FOR A RATIO DELAY STUDY

1. FIRST YOU HAVE TO SELL RATIO DELAY

Although you may think it's simple enough, you'll find many of your associates in management won't believe it—in a 5-minute introduction. Operators won't buy a brief explanation, either, if you need their participation. The very natural reaction is that you can't possibly get a true picture if you don't watch the operation continuously.

There is surely no need to tell you how important it is to have the complete understanding and confidence of the people who are concerned with the results of your study. The best way we've found to sell ratio delay is the explanation in "Why does ratio delay work" (see fold-out pages following page 84). By all means, include the dice and chart demonstrations. They are more effective than a long talk in getting the idea across.

2. DEFINE THE PROBLEM

Determine exactly what information is required. We usually make a preliminary survey—observe the operation for a day—to get a list of the operation elements.

For instance, if you're after the causes and amount of downtime on a machine, you'll need to define all the possible causes. It's much the same as the preparation for a time study.

3. MAKE AN OBSERVATION RECORDING FORM FOR THE JOB

We don't use a standard form. We've found it best to design a form to fit each study. There's a sample of one on the preceding page.

4. SELECT THE FREQUENCY OF OBSERVATION

Should you observe the operation 8 times a day? 50 times? or some other number? The frequency you select depends upon:

a. Nature of the operation. If it's a short-cycle, repetitive operation in which all the elements you want occur frequently, you can spread out the observations. If it's a non-repetitive operation, or one in which some elements occur infrequently, it's better to make more observations in a day. That improves the chance of getting all the details.

b. Physical limits. If you have just one observer and a long route to make one round of observations, you'll have to make fewer observations in a day. For instance, a study of maintenance crews would probably make a long route for one observer.

c. Total number of observations required and the time limit. If you need 1500 observations for desired accuracy in 15 working days, you automatically need 100 observations a day.

5. ESTIMATE THE NUMBER OF OBSERVATIONS YOU'LL NEED

You need it to plan the frequency, number of observers, and length of the study. The number depends upon how accurate you want the answers. A larger number of observations provides greater accuracy. Experience with ratio delay and a knowledge of the operation will enable you to make a pretty fair off-the-cuff estimate. You can check the results as the study progresses to see when you have enough observations. The next section contains a simple chart that signals the end.

There is a mathematical method of pre-estimating the number of observations you'll need to give you the practical accuracy you want. Most management people won't want to understand the fairly complicated mathematics involved—and they don't have to.

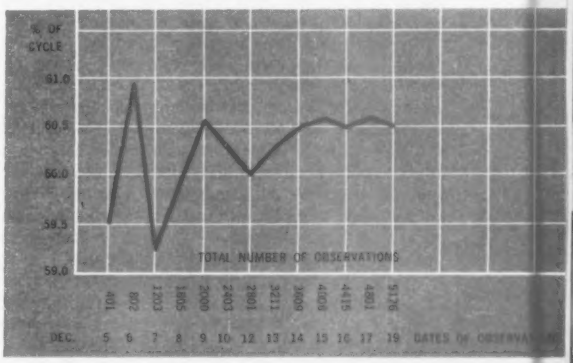
The theory is the same as that used in statistical quality control. If you want to get 100% of the potential value of ratio delay, you'll want to have some person around your plant who has an understanding of the mathematics. He can then give you quick help in predetermining the number of observations you should take and interpreting to you how finely accurate the results are.

You'll want him to watch the progress of the observations, too. Sometimes he may be able to tell you, with great accuracy, that you don't have to take as many observations as you had originally planned. Or perhaps, that to be safe you must take more than you had originally figured.

Most companies have several engineers who are able to understand and use quickly the mathematics involved. For their benefit, we give at the conclusion of this article an explanation of the statistics of ratio delay.

6. PRIOR TO THE START OF A STUDY WE HAVE A SESSION WITH THE OBSERVER, OR OBSERVERS

We clearly define and discuss each element to be observed and recorded. This step is very important where two or more observers study the same operation. Without it they may not be consistent in what they call what they see.



RUNNING RECORD of percentage occurrences of an element levels out when you have enough observations.

HOW TO MAKE THE STUDY

To help make this part clear let's use one of our studies as an example.

The purpose of this particular study was to find the causes and magnitudes of lost time on a group of 16 drawbenches. A drawbench is a machine that cold-reduces the diameter of tubing by grasping and drawing the tubing through dies. There are machines of seven different drawing capacities in this group.

We assigned 3 observers to this study. They

made 5176 observations during a 13-day period. That's an average of 133 observations per man per day. But don't use that as a standard. It could be more or less, depending on the factors discussed in the preceding section.

As part of the study preparation (one step that can be done at the last minute), we selected a spot at each drawbench from which the observation was to be made. The observer walked to this spot, made a mark on the observation form opposite the element taking the machine time at the moment. Coach the observer not to quicken or slacken his pace as he approaches the machine in anticipation of a change.

Here are a couple of variations you may want to use on an occasional study (we didn't in this case):

1. You can record the time of each observation if you want to analyze the frequency of element occurrences.

2. You can apply a performance rating of the element observed, but the observer must be qualified to rate.

We set up a route for each observer to follow in making his rounds of the drawbenches. To get random observation times he began his rounds at a different machine each day. Also, he varied the travel time between machines.

At the end of the first day we had another meeting with the observers to discuss problems and questions resulting from their experience.

We summarized the results of each day's studies the day after they were made. It doesn't take much time; it's very much faster than summarizing time studies. We simply divided the number of observations of each element by the total. We plotted the accumulative percentage of each element on a chart of percentage *vs.* number of observations (see sample on page 87). These charts provide a very simple way to decide when data are sufficiently consistent (accurate) to stop the study. The charts are easy to understand and explain, too. Their only disadvantage is you can't use them to preplan the length of the study.

That's all there is to collecting the facts by ratio delay.

HOW TO USE THE STUDIES

Information isn't much good unless you use it for some practical purpose. All the ratio delay studies in the world won't do you a bit of good unless you make effective use of the facts they supply.

We did two things with the facts from our drawbench study:

1. We set up goals and upper and lower control limits for production time and the major causes of delays. Then we make check studies by ratio delay (of shorter duration) each month to see if delays are under control.

2. Armed with facts about what kind and how much delay we had on our drawbenches, our supervision went to work. Trained in work simplification, they know how to develop better methods. And they did.

The result of getting and using the facts was a healthy 19% boost in productivity of our drawbenches.

THE MATHEMATICS OF WORK SAMPLING

A Technical Guide for You or Your Engineer

When you use random sampling, you're dealing with two kinds of potential errors at the same time. Both can be determined, but they depend upon one another.

In every kind of measurement work, we accept a certain tolerance. It's the economic thing to do. Random sampling is merely a way of measuring, so we accept a tolerance here. We call it percentage deviation.

However, with random sampling, there is a chance that the result of our observations will be outside the percentage deviation (acceptable tolerance), even though the actual percentage composition of the total is within the tolerance. This is the probability of statistical error.

Percentage deviation and statistical error are related through what is known as the "standard error of deviation."

This standard error is expressed by the following formula:

$$x = \sqrt{\frac{p\,(1-p)}{N}}$$

in which, x = the standard error
p = percentage occurrence of the element being sought, expressed as a decimal (i.e., write 75% as 0.75).
N = total number of random observations.

Notice that it is necessary (for purposes of the equation) to know the percentage occurrence of the element you are checking *before* you can determine the accuracy of your observations.

So—for the present, estimate this percentage before you start your sampling, and guess the number of observations you'll need. (We'll come back later to how you revise your estimates.)

Now substitute your estimated figures for p and N in the equation, and solve for x, the standard error. What have you got?

A complicated statistical derivation, which we needn't bother with, tells you that 68 times out of 100, the result of N observations will fall between $p-x\%$ and $p+x\%$. This is known as the range of one standard error.

If $\pm x\%$ is an acceptable tolerance, you know that the probability is that 68% of the time your random observations will reflect the fact (which we assumed at the outset) that the element you are observing is within tolerance. But conversely, you'll get a *false* indication 32% of the time.

That's just plain not good enough for most uses. Too much is left to chance. But if we will accept *twice* the standard error as our tolerance, then there are only 5 chances in 100 of getting a false indication from N observations. For most applications, this is a reasonable chance to take.

Here's why it's reasonable: There are only 27 chances in 10,000 that N observations will vary from the actual percentage, p, by more than $\pm 3x$, or three standard errors.

Let's see just what this means in practical terms. Take a simple situation in which you want to know the amount of downtime on a machine tool. You *guess* that it's running about 30%. But you want to be sure within $\pm$ 5% (that's your acceptable tolerance on *downtime*—and it's 5% of the 30%, not 5% of total clock hours for the machine).

If we call element tolerance y, we have this simple relationship between element tolerance and the standard error (or tolerance as a percentage of the whole):

$$y = \frac{x}{p}$$
$$\text{or } x = yp$$

In this case of the machine tool, we would have

$$x = 5\% \text{ of } 30\%$$
$$\text{or } x = 1.5\%$$

However, we know that we want to work with two standard errors, so that our chance of false results will be only 5 out of 100. So, for purposes of the standard error equation, our x must be one-half of 1.5%, or 0.75%.

We now know x and p in the original equation. So let's go back and solve it for N, the number of observations. We get:

$$N = \frac{p(1-p)}{x^2} = \frac{0.30(1-0.30)}{(0.0075)^2} = \frac{0.21}{0.00005625}$$

$$N = 3730$$

If we make 3730 observations, and find that downtime occurs in between 1065 and 1175 observations (30% $\pm$ 1.5%), we know that there are 95 chances out of 100 our original guess was valid within the tolerance we agreed to accept.

But, suppose instead that at the end of 2500 observations, we have made only 500 observations of downtime. That's only 20%.

Where do we go from here?

Start your calculations over by assuming p is 20% and N is 2500. Solve the standard error equation for x. You'll find it's 0.80%. But that's one standard error; we are using two, and that's 1.6%. To convert that to "element tolerance," we divide it by our new p, or 20%. We find that the range of 95% accuracy is now 20% $\pm$ a tolerance of 8%. Not good enough; we wanted 5% tolerance.

So it's back to equation, using an element tolerance of 5%, and p equal to 20%. To satisfy our conditions, we now find that 6400 observations are needed to satisfy the original conditions.

Before we get to 6400, of course, we'll go through the mathematics again to see how we are coming out. That let's us make any necessary adjustments. It's what the mathematicians call the process of successive approximations.

To see how it works in a different way, suppose that our first 2500 observations indicated 40% downtime. In that case, we'd find the standard error to be 1%; two standard errors would be 2%. And that is just exactly $\pm$ 5% tolerance of the element percentage of 40%. So we stop making observations.

In the case above, we have been working with fairly large percentages. What if we had been going after elements that occur only a small percentage of the time? Or if we wanted very small tolerances?

The easiest way to see what happens is to take our formula for element tolerance ($x = yp$) and substitute it in the standard error formula, which we have set up to solve for N.

$$x = yp$$

$$\text{and } N = \frac{p(1-p)}{x^2}$$

$$\text{thus } N = \frac{p(1-p)}{y^2p^2} = \frac{1-p}{y^2p}$$

First, keep in mind that y and p are always decimals smaller than 1.0. Now, as p gets smaller, the numerator of that equation gets larger at the same time that the denominator gets smaller. So the number of observations you need for a given tolerance will increase rapidly as the percentage occurrence of the element decreases.

When you tighten up on the tolerance, the required number of observations increases as the *square* of the allowed tolerance. That is, a tolerance of 1% will require four times as many observations as a tolerance of 2%.

Since you'll be working with two standard errors (95% accuracy) most of the time, here's a formula that will give you directly the number of observations needed for any given percentage occurrence and element tolerance:

$$N = \frac{4(1-p)}{y^2p}$$

And here's a table of the required number of observations for some common combinations of percentage occurrence and elements of tolerance:

Percentage Occurrence	1% element tolerance	5% element tolerance	10% element tolerance
1%	3,960,000	158,400	39,600
5%	760,000	30,400	7,600
10%	360,000	14,400	3,600
20%	160,000	6,400	1,600
30%	92,000	3,680	920
40%	60,000	2,400	600
50%	40,000	1,600	400

HOTPOINT'S PROGRAM OF

Planned Advancement Fills

How it works for a typical employee

ASSEMBLY WORKER wants to be a machine operator. He has filled out Hotpoint's planned-advancement inventory forms. Now there's an opening, so plant personnel manager tells him about it.

HE'S INTERVIEWED by personnel manager and foreman of machine department. They find he has qualified himself by taking one of company's in-plant training courses. He'll do, they say.

How it can work for you to...

...eliminate major layoffs
...reduce shortages of needed skills
...give workers advancement to jobs they prefer

SINCE THE START of Hotpoint's planned advancement program two years ago, we have had no major lay-offs. But there have been serious production cutbacks caused by materials allocations. And last year's difficult inventory situation in the appliance industry also had to be weathered. In addition, since 1950 we have filled 80% of all job openings by advancing employees who have qualified by planned training.

In the last 8 months alone, over 600 employees have been advanced to jobs that we needed filled, *and that they indicated they preferred.*

By developing in-plant skills we have greatly reduced the problem of recruiting higher-skilled workers. And the system has also stimulated employees to *want* advancement. Over 85% of our employees have told us so. Of this group, more than 90% asked for help in reaching their objectives. We've been glad to give that help, of course.

It's a major management problem to maintain a work force in which fluctuations due to materials shortages, changed schedules, or seasonal demand are kept to a minimum. The problem is particularly difficult during a period of expansion, when new facilities are being built, tooled, and put into operation. It was at just such a time in 1950 that Hotpoint inaugurated its 4-step program of planned employee development. Its goal was to provide a stable, yet flexible and steadily improving work force. We feel we have accomplished that.

And here is the program that has enabled us to do so:

STEP 1. WE FORECAST EMPLOYMENT REQUIREMENTS

We figure how many employees will be needed on a quarterly basis. Each quarter we set a definite production schedule for the next—and estimate the schedules for the following four quarters as well. Estimates are based on sales forecasts, future

Jobs Right

By WILLIAM A. KISSOCK • Vice President, Industrial Relations
Hotpoint, Inc., Chicago

HE STARTS NEW JOB in machine shop. Here he's getting on-the-job instruction on the machine he'll operate. He's just one of over 600 employees who moved ahead in past 8 months.

orders, and (more important these days) materials allocations.

Transposing this schedule into employment requirements is the next job. It's fairly easy for us.

Our production schedule is in the form of so many refrigerators, so many ranges, etc. We know the man-hours needed to manufacture each. So we multiply the number of units to be built by the standard hours needed to build each, and add the figures up. Divide the grand total by the number of working hours in the quarter, and you have the number of employees required.

Now let's make some assumptions to see how the information we have can be put to use. Assume that materials allocations will cut production in the next three months. That means we shall need fewer workers than we now have on the payroll.

The first question we must answer is whether normal turnover, draft and military reserve calls, and retirements will make up the difference.

Our records give us the answer. We know that the percentage of labor turnover is closely related to total employment. For example, at a total employment level of 9000 the rate is about 3.2% per month. At 6000 it's about 2.9%; and below 6000 it runs around 2.7%.

We also have facts about military inductions and reserve recalls from surveys of the age, previous military experience, and essential skills of every employee. By carefully studying government estimates on future induction and recall plans, we can tell the impact of military demands on our work force. Takes time, but so far we've been quite accurate.

Retirement predictions are easy. Our employees retire at 65.

By adding up our three sets of predictions—normal turnover, losses to military services, and retirements—we have a good idea of how many employees we can expect to lose each quarter. Of course, we can also project such loss estimates further into the future if we have to.

Now we can answer our question as to whether turnover will reduce our work force enough to match our reduced production needs. For illustrative purposes let's assume it won't. Does that mean we call a lay-off?

Right here is where our plan pays off. We have ample warning, and can make adjustments to avoid the necessity of laying anyone off. In our hypothetical case, for example, we know that materials allocations will ease up within the quarter. So we could arrange for the excess workers to do needed maintenance work within their division, on a temporary basis. Or we could temporarily transfer the workers to another product division that needs extra workers to meet a seasonal demand.

If the lower production schedule looks like a long-term affair, we might make permanent transfers to other divisions. In any event, we have ample time to do *something*.

This job-transfer system has been a major factor in avoiding lay-offs.

Actually our illustration has been purposely pessimistic. Even in the days of the worst materials allocation curtailments we've found that turnover has more than taken care of any decrease needed in the work force. To date the main value of our calculations has been to tell us how many employees we will have to *recruit*.

STEP 2. WE INVENTORY WORKER SKILLS, APTITUDES, AND JOB PREFERENCES

Inventorying employees is done by a combination of questionnaire and personal interview.

The questionnaire • Here's a brief summary of how we use the questionnaire and what's in it.

Questionnaires were sent to all hourly rated and salaried employees below the management level when the program started. New employees get

theirs soon after they start to work. There are five pages.

The first page calls for personal history information, followed on page 2 by a section called "Planned Advancement Work History." Here the employee describes the four most significant jobs he has held at Hotpoint or elsewhere.

Pages 3 and 4 provide space for filling in job preference information. Instructions direct the employee's attention to a list of 109 jobs on page 5 (43 hourly and 66 salaried) that are available in the company. There's space to name three preferences—which should be for jobs for which the employee is qualified or for which he is working toward qualification.

In each case the employee is asked to explain why he feels he's qualified—applicable education, training, work experience, hobbies, and courses of study.

Quite important, we think, is this statement on the form: "You may make revisions later." It eliminates the feeling that the worker's future hangs forever on every word he writes. Further, it encourages workers to tell us what they **really** want to do—not what they think will look best to the personnel department.

All the information on the questionnaires is put on IBM cards, classified by present skills and potential skills. To simplify this process, we have broken down all our jobs into 35 basic skill types. By proper tabulation, we can get:

- Names of all workers who are actually or potentially qualified in any of the 35 basic skills.
- Names of all who are actually or potentially qualified for every job in Hotpoint below the management level.

This information alone is very useful. We have already found that 35% of employees have skills that are useful at Hotpoint on jobs other than the ones they're now working on.

The interview · Each employee's planned advancement questionnaire is reviewed with him twice a year in personal interviews. These interviews have several important values:

1. They give workers the chance to talk over the whole planned advancement program.
2. They give workers a chance to revise their ideas and change their preferences.
3. They give management a chance to explain to some workers why they haven't been advanced (if that's the case).

If an employee's preference doesn't fit in with his past work experience, the interviewer tries to work out courses of training and study to help. But, more important, he also tries to find out why the man wants to switch. Is he properly placed on his present job? Is he generally dissatisfied with his work? He probably is, if he's constantly asking for transfers from one machine to another. But, if he's a machine operator who wants to move up into, let's say, production scheduling, he's probably the kind of man who genuinely seeks advancement. And, if he takes the initiative in getting the training he needs, he's probably a man to watch.

In general we try to give every employee as much help and guidance as he wants or needs. But we also feel obligated to give him straightforward guidance. So we don't hesitate to discourage the man who obviously is seeking the unattainable.

STEP 3. WE TRAIN AND GUIDE WORKERS

We set up specific training programs whenever expansion is scheduled, or our periodic checks of the skill inventory reveal a short supply of a needed skill. We key the number of workers to be trained to our estimates of present and future needs. We don't want to train men, or encourage them to take outside training, and then find we can't use their newly developed skills.

In-plant courses are given on company time to the best qualified among those who have listed preference for the jobs involved. We have given 15 such courses in the past 2 years, varying in length from 6 to 40 hours. The shorter courses are generally for workers who have had related past experience. We give only as much training as is needed to qualify the men fully. That means some courses are just "refreshers."

STEP 4. WE ADVANCE ON A PLANNED BASIS

The IBM catalog serves as a central requisitioning system for all departments.

Suppose, for example, we need 25 new set-up men in the press department. We simply run an IBM sort of the cards of all men who are qualified or potentially qualified. Let's say there are 45 cards in all. The sorting enables us to identify those who have had actual set-up experience and those who lack direct experience, but have had related experience and training.

Now assume that there are 15 men who have had direct experience. We interview them first, verify their background claims, and make sure they want the transfer. Then they go right to work.

Next step is to interview the 30 men in the "potential skill" class. The main job is to determine just how much on-the-job training would be needed to qualify them. Once this is established, the training is planned and the men selected go right into the program. As they reach proficiency, they move from training over into direct production.

This process of planned selection and advancement yields substantial benefits to both company and employees. Employees know we will not hire from the outside until we have used up the possibilities of advancing from within. We know that we are getting seasoned, interested employees for key jobs.

THIS ORGANIZATION CHART helps newcomers put names to faces.

Eastman speeds up orientation process by letting...

Photos Tell Who's Who

By G. H. GUSTAT
Superintendent, Industrial Engineering Division
Kodak Park Works, Eastman Kodak Company
Rochester, N. Y.

HOW ARE NEW MEN HANDLED in your organization? Are the introductions rapid? Do they follow one another so fast that in an hour a new man is confused by a sea of faces and a long list of names?

Since most people are not endowed with *photographic* minds, we have installed a flexible, easily changed *photographic* organization chart in our division. It shows departmental structure at a glance. It provides a readily accessible name-and-face association aid.

The chart is primarily for new men. It is an investment in morale building since it permits them to become acquainted *gradually* with the names and faces of their associates.

New men can also use the chart to help make contacts in other groups and units of the division. Upon entering the division they are shown where they fit in the organization and the positions of the people they meet. To emphasize the arrival of new employees, their photographs are displayed, for a short time, under the heading, "Have you met them?"

This type of chart has been found helpful because the division is relatively large and changes within the organization, as well as additions, occur quite frequently. A flexible chart is a necessity to insure an up-to-date condition at all times.

The chart is located in an accessible place in the department near the person responsible for its maintenance—which takes only 2 hours a month.

HOW THE CHART IS SET UP • It's a conventional chart with departmental titles and structure to permit use as an organization chart—with the names and photographs added to provide other uses. The pictures used are contact prints from 35 mm. negatives originally used for photographic identification passes. This size allows head-and-shoulder photographs. By masking the negative it is possible to leave a white space on the photograph for the individual's name.

An investment of approximately $60 included a slotted bulletin board, title letters, and transparent acetate windows, but excluded the already available photographs and glass-covered frame.

IDEAS OF THE MONTH *for*

By LEWIS K. URQUHART • Managing Editor

NEW DIE CRADLE means you kiss good-bye all those haphazard methods of supporting dies, jigs, etc., while drilling or whatever. It's made of 2 parallel frame-form units with an adjusting rail that joins them together. Two bolts and two wing nuts permit quick, easy, secure, sliding adjustment to any desired spread up to 18 inches. Prices range from $18.50 for the model with 2-in.-high parallels to $43 for the 7-in. job. Aero Safety Parallel Div., 24 S. Crawford Ave., Chicago 24.

GOT FINISHING PROBLEMS? Least you can do is write Weldon Roberts Rubber Co., Newark 7, N. J., for a free sample card that contains three hand-tablet samples, one of each of three textures, of Brightboy, its rubber-cushioned abrasive.

SPRAZON, as you might expect, means "sprays on." Put GRAKO in front of it and you have the abracadabra for Graton & Knight's liquid belt dressing in a handy spray container. Operator can treat moving belts without danger.

YOU'LL GO FOR those round-square canvas baskets made by W. T. Lane & Bros., Inc., Poughkeepsie, N. Y. Round opening for easy filling. Rectangular sides for easy carrying. They come in six sizes. Look like the answer to a lot of handling jobs.

"PROGRESSIVE MECHANIZATION" is a program aimed at boosting American productivity. It consists of (1) a 16-mm. sound-color motion picture, (2) a manual, (3) a survey form and checklist. Comes in a kit that contains one print of the picture, 5 copies of the manual, 25 copies of the survey form. Can be purchased outright from General Electric Co. (Schenectady 5, N. Y.) at cost—or is available for single showing through GE Apparatus offices.

YOU, TOO, CAN MAKE professional-looking charts with PictoTapes now available. Symbols include men, women, children, stacks of coins, stacks of bills—all repeat-printed on pressure-sensitive tape, $\frac{5}{8}$" wide and 300" long. $2.50 per roll. Chart-Pak, Inc., 104 Lincoln Ave., Stamford, Conn.

LOOKS LIKE TAPE MONTH. Here's one that's for all practical purposes 100% waterproof. It's Polyken 329. For details write Bauer & Black, 222 W. Adams St., Chicago 6.

ANOTHER TAPE you ought to know about is Bi-Seal Self-Bonding Insulating Tape, made by The Bishop Mfg. Co., Cedar Grove, N. J. It fuses into a solid mass of insulation when applied.

SEEN THOSE NEW WORK GLOVES with black plastic dots to make them wear longer? Riegel Textile Corp. (PO Box 170, GC Sta., New York 17) sent us a pair. In no time at all five fellow-workers had kindly offered to take them off our hands. Literally, that is. Riegel says they cost only a nickel more than the regular kind.

Factory Executives

REMOTE HANDLING would be our personal preference if we had to mess around with radioactive stuff. So we were interested — and think you will be, too — to learn that Tracerlab, Inc., 130 High St., Boston 10, has developed a remote magnetic handler for easy positioning and manipulation of radioactive sources in ferromagnetic materials. It's made of aluminum tubing. Has a 12-in., chrome-plated, flexible gooseneck leading to a short, stainless steel tip. There's a permanent Alnico magnet encased in the tip — and a cast aluminum grip is depressed to withdraw the magnet from the inner surface of the tip and thus release the source.

TITANIUM, as you know by this time, is the newest and lightest of the "wonder metals." Word from Douglas Aircraft is that 88% of the skin on the new DC-7 engine nacelles will be titanium sheet — for a weight saving of 200 pounds per airplane (roughly one passenger and luggage).

BOOKLET OF THE MONTH? Our vote goes to "What's a Silicone?" We'd wondered. Now we know—and think you'll want to know, too. You get your free copy from Dow Corning Corp., Midland, Mich.

FROM VAPOR HEATING CORP., CHICAGO, comes a schematic piping diagram. It's laminated between plastic sheets so it won't get dirty or torn. VH sends one along with each steam generator. Some day every equipment manufacturer may catch up with this smart practice. Till then you can have your own made up.

ANGLE-CHEK is what Sheridan-Gray Co., Redondo Beach, Calif., is calling its new protractor for measuring angles on sheetmetal parts. Accuracy is within plus or minus 5 minutes.

NEW TORQUE SCREWDRIVER is distinguished for its easy-to-read dial. Takes interchangeable bits, so can be used for all types of screws. Comes in sizes for precision torque measurement from 0-6 inch-ounces to 0-24 inch-ounces. Apco Mossberg Co., Attleboro, Mass.

ALWAYS WONDERED WHY plant men scrawled on blueprints with ordinary lead pencils. Probably because American Lead Pencil (Hoboken, N. J.) hadn't yet come up with its thin-lead blueprint marking pencil—yellow on one end, vermilion on the other.

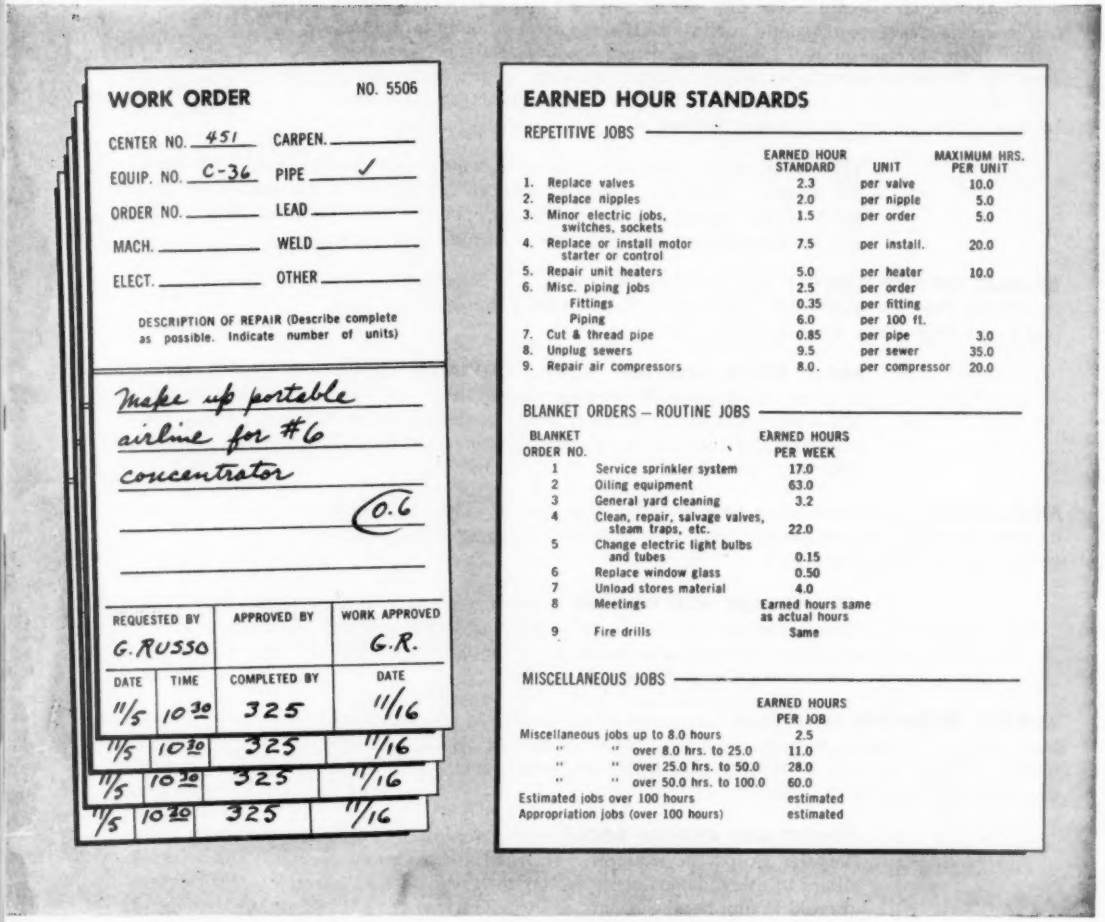
"TIRED" AND RETIRED TOOLS aren't necessarily ready for the scrap heap. Chrysler Corp., for example, reworks some to fit new specifications, reissues others to other departments where they can be used effectively. Still others are sold to suppliers who can use them. Only what's left adds to the tonnage of Chrysler's intensive scrap metal drive.

ARE YOU A SLOW FIGURER? Would you like to know some of the shortcuts the experts use? For $1 you can get yourself a 32-page booklet called "Fast Figuring for Executives." M. Buten & Sons, 1834 South St., Philadelphia 46.

How one company makes effective use of

Work Measurement for

Harshaw Chemical Company uses adjusted past performances as the basis for work measurement. We don't think it's the *best* basis. But it's a simple way to set time standards. Harshaw says the standards are *much* better than none. They've helped maintenance supervisors do a better management job.



WORK ORDER NO. 5506

CENTER NO. 451 CARPEN. ____

EQUIP. NO. C-36 PIPE ✓

ORDER NO. ____ LEAD ____

MACH. ____ WELD ____

ELECT. ____ OTHER ____

DESCRIPTION OF REPAIR (Describe complete as possible. Indicate number of units)

Make up portable airline for #6 concentrator

0.6

REQUESTED BY	APPROVED BY	WORK APPROVED
G. RUSSO		G.R.

DATE	TIME	COMPLETED BY	DATE
11/5	10 20	325	11/16
11/5	10 20	325	11/16
11/5	10 20	325	11/16

EARNED HOUR STANDARDS

REPETITIVE JOBS

		EARNED HOUR STANDARD	UNIT	MAXIMUM HRS. PER UNIT
1.	Replace valves	2.3	per valve	10.0
2.	Replace nipples	2.0	per nipple	5.0
3.	Minor electric jobs, switches, sockets	1.5	per order	5.0
4.	Replace or install motor starter or control	7.5	per install.	20.0
5.	Repair unit heaters	5.0	per heater	10.0
6.	Misc. piping jobs	2.5	per order	
	Fittings	0.35	per fitting	
	Piping	6.0	per 100 ft.	
7.	Cut & thread pipe	0.85	per pipe	3.0
8.	Unplug sewers	9.5	per sewer	35.0
9.	Repair air compressors	8.0.	per compressor	20.0

BLANKET ORDERS – ROUTINE JOBS

BLANKET ORDER NO.		EARNED HOURS PER WEEK
1	Service sprinkler system	17.0
2	Oiling equipment	63.0
3	General yard cleaning	3.2
4	Clean, repair, salvage valves, steam traps, etc.	22.0
5	Change electric light bulbs and tubes	0.15
6	Replace window glass	0.50
7	Unload stores material	4.0
8	Meetings	Earned hours same as actual hours
9	Fire drills	Same

MISCELLANEOUS JOBS

	EARNED HOURS PER JOB
Miscellaneous jobs up to 8.0 hours	2.5
" " over 8.0 hrs. to 25.0	11.0
" " over 25.0 hrs. to 50.0	28.0
" " over 50.0 hrs. to 100.0	60.0
Estimated jobs over 100 hours	estimated
Appropriation jobs (over 100 hours)	estimated

WORK ORDER SYSTEM ...

Production supervisor originates work order form. He sends original and two carbons to maintenance superintendent, keeps third carbon.

... PLUS EARNED-HOUR STANDARDS ...

These standards are the backbone of the control system. Standards are based on actual recorded times. Averages are leveled by multiplying average actual times by 75%. That's standard. They're set up as shown above.

Maintenance Control

By ROBERT A. DILLEY
Midwestern Editor

WORK MEASUREMENT didn't solve all the maintenance problems. But it made little ones out of big ones. That's what Paul Pine says. He's superintendent of manufacturing of Harshaw Chemical Company, Cleveland. He ticks off nine real benefits that came directly or indirectly from maintenance control based on work measurement:

1 · Boosted maintenance labor performance. Over a 2½-year period, performance has climbed 14%—without much pressure. (There's no wage incentive attached to the plan.) There's some type of standard for all maintenance work, including repetitive, non-repetitive, and major appropriation jobs.

2 · Guides scheduling of balanced work loads for individuals and groups of maintenance workers. Each man has a priority-rated backlog of work orders at all times. There's no waiting for work assignment.

3 · Helps match men and jobs. Comparison of actual and standard times on assignments shows which jobs some men do better. Supervisors use the performance records to guide them in scheduling jobs for the men who appear best at the type of work.

4 · Points up need for training. Investigation of low performances sometimes shows the cause to be inadequate training in the type of work.

5 · Makes supervision more effective. Maintenance supervisors have a tool that substitutes measurement for guesswork. They know their workmen better. They can schedule work more accurately. They can convert some of their emergency trouble-shooting time to maintenance planning.

6 · Lays the foundation for preventive maintenance. The plan provides the necessary records to get a clear picture of maintenance requirements with regard to labor, materials, machines, and equipment. Without knowledge of these details it's impractical to try to set up a real preventive maintenance program. Harshaw is changing from emergency repair to planned maintenance.

7 · Spots excessive maintenance cost. The records of machine maintenance costs aren't dependent on work measurement,

EARNED HOUR SUMMARY REPORT

MAINTENANCE DEPARTMENT

PLANT HARVARD DENISON

WEEK ENDED 4-25-52

	CURRENT WEEK			8-WEEK TOTALS MOVING AVERAGE		
	EARNED HOURS	ACTUAL HOURS	%	EARNED HOURS	ACTUAL HOURS	%
BLANKET ORDERS	240.4	373.0	64	1693.5	2104.1	80
MISCELLANEOUS JOBS	730.0	825.6	88	7367.5	7795.7	95
REPETITIVE JOBS	767.7	890.7	86	6779.6	7444.1	91
ESTIMATED JOBS	88.0	95.0	93	1304.1	1434.4	91
APPROPRIATION JOBS	0	0	0	662.8	720.4	92
TOTAL	1826.1	2184.3	84	17807.5	19498.7	91
OVERTIME HOURS — INTERNAL CHECK	202.05					
WEEKLY % MAINTENANCE HOURS TO PLANT HOURS	28.6%					

... PROVIDES CLOSE CONTROL OF MAINTENANCE

Earned-hour summary report is prepared and submitted to Harshaw executives each week. Earned and actual hours for each class of work are shown. Percentage column indicates performance on each class.

but measurement of the work that goes into the costs gives Harshaw more confidence in their accuracy. Now the company keeps one eye on the records when it writes equipment specifications. In one case, after the records showed up a trouble spot, maintenance cost was cut from an average of $7000 a month to $1600—a 77% saving.

8 • **Guides machine replacement by cost records.** The company has learned to depend on the records to show when it's economical to replace facilities on the basis of comparative maintenance costs.

9 • **Cuts outside contract jobs.** Improved performance of the maintenance force permits it to take on major plant improvement and expansion work. Makes it better for the company and the maintenance personnel.

Harshaw's work measurement system

The company called in a consultant to help fight rising maintenance costs. He set up a work order system that covers *all* maintenance work.

Blanket orders cover the routine jobs—service sprinkler system, oil equipment, service valves, and so on. Production supervisors originate individual work orders for all other work.

The maintenance superintendent assigns the jobs, gives a copy of each work order to the workmen. Each maintenance man enters jobs and actual job work time on his personal time card.

A time clerk keeps tabs on the actual time worked on each job, enters the total on copies of the work order. The original copy goes back to the production supervisor who originated the order. Two other copies go to a standards clerk.

The standards clerk calculates the standard time for each work order. He files one copy in an equipment record file where it's available to find the maintenance cost of any piece of equipment. The standards clerk also compiles a weekly report of performances—the sum of the standard time for all jobs completed divided by the sum of the actual work times.

In addition to the performance on all classes of work, the clerk calculates the performances on blanket orders, miscellaneous jobs, repetitive jobs, estimated jobs, and appropriation jobs.

All interested plant executives get a copy of the performance report. The maintenance superintendent investigates the performances beyond reasonable fluctuation.

Harshaw's time standards

Samples of the time standards appear in the table on page 96. On the basis of the method of development, there are three types of standards:

Routine and repetitive job standards are adjusted averages of the actual times required to do these jobs. The company recorded the actual times on the work orders until it had enough data to compile standards. The average actual time was factored by 75% to set a target standard.

Miscellaneous jobs are non-repetitive jobs of too short duration to justify estimating the required time. The standard hours credited for these jobs are based on the actual time. (See the table of standards.) In each time bracket the standard is 75% of the past average time for all miscellaneous jobs that fell within the limits of each bracket.

Estimated and appropriation jobs are non-repetitive jobs in excess of 100 hours. The maintenance superintendent estimates the hours required. Then he multiplies the estimate by the average total performance during the preceding 8 weeks to get the standard time for the job.

For example, to install a compressor he estimated it would take 200 man-hours. The 8-weeks' average performance was 91%. The standard was 0.91 x 200 or 182 standard hours. On this job the crew actually spent 230 man-hours. So their performance was 182 divided by 230, or 79%.

How much does the Harshaw plan cost?

One of the Harshaw plants has 677 maintenance workers. It takes three people—a time clerk, a standards clerk, and a typist—to operate the system there.

Another of the Harshaw plants requires one full-time and one half-time clerk to operate the work measurement system for 32 maintenance craftsmen.

Average cost of the system in the two plants is 4.5% of the maintenance payroll, in terms of number of people (4½ clerks, 99 maintenance workers). Harshaw is satisfied that the system more than pays for the clerical cost.

First jobs get done first in this...

Maintenance Scheduling Plan...

. . . and efficiency of the plant engineering department is kept at a high level. Yet the system is simple, with not too much paperwork. It controls the work of hundreds of craftsmen, yet you can adapt it to a small plant.

By C. E. STEPHENSON, Engineer, R. J. Reynolds Tobacco Company, Winston-Salem, N. C.

TWO FORMS, A CHART AND A GRAPH, make up our simple maintenance work-scheduling system for several hundred craftsmen.

We keep the system simple; work scheduling can get awfully complicated if you let yourself get tied up in paperwork. Our plant doesn't sacrifice any of the following advantages you can expect of proper work scheduling:

1. Production departments and the engineering department know exactly when work is to be started and completed.
2. Each maintenance craft knows in which week it is assigned to work on a project.
3. Each craft knows exactly how much manpower it will have to supply.
4. Projects are scheduled according to priority.
5. Future work loads can be determined.
6. Any needed adjustments in the size of working force can be anticipated.
7. Projects can be scheduled to try to maintain a constant size working force.

THREE BASIC CONCEPTS · In the development of our work scheduling system we came to several important conclusions for simplification:

1. We schedule by the week, not by the day. Weekly scheduling is desirable because its flexibility gives a decided advantage over the too rigid feature of daily scheduling. We find that capable supervision, close to the job, can schedule the work for each day effectively if the over-all plan is arranged by the week.

2. We use man-days, not man-hours, as a basis of scheduling, although estimates are originally made in man-hours. This method keeps the figures smaller, and makes the forms more manageable and understandable.

3. We schedule only projects that cost more than $300—we don't schedule small repair and construction orders. To include all small orders would make for a top-heavy system. A good foreman can "work in" small orders to best advantage. Our foremen plan the day's work on the previous afternoon. Usually within 5 minutes of starting time you will find every field craftsman out on the job with tools and materials.

BASIC PAPERWORK · It goes almost without saying that scheduling of maintenance manpower requires *all* orders to be in writing, and *all* work to be done on some type of numbering system. Our system works as follows:

Repair and small construction orders · On jobs to cost not over $300, properly authorized production supervisors send a written order to the craft foremen in the engineering department. These orders are acted upon by them directly, without scheduling control.

Projects · Every job to cost over $300 must be authorized as a project. Also separate "engineering" work orders must be issued.

To get authorization, a production superintendent sends a "Request for Estimate or Report" to the engineering department. On it he describes contemplated work. A staff engineer best qualified for that type of work (electrical, design, etc.) studies the request thoroughly, estimates the cost, and issues a written report on the feasibility of the proposal. Craft foremen help in developing manhours and material estimates.

The engineer's report then goes back to the originator. If he thinks the work is justified, he attaches the report to a formal "Request for Authorization" and sends it to top management for approval. The request summarizes work contemplated, costs, return on investment, and other pertinent facts.

If management approves the request, it goes back to the engineering department. Here a "coordinator" (junior or senior engineer) is assigned to the project. He prepares work orders for each craft involved, describing the work to be done and the estimated man-days of labor required. All copies are sent to the construction and maintenance (C&M) division for scheduling and execution of the job.

What's taken place up to this point is that the work has been fully authorized and specified. Now we are ready for scheduling.

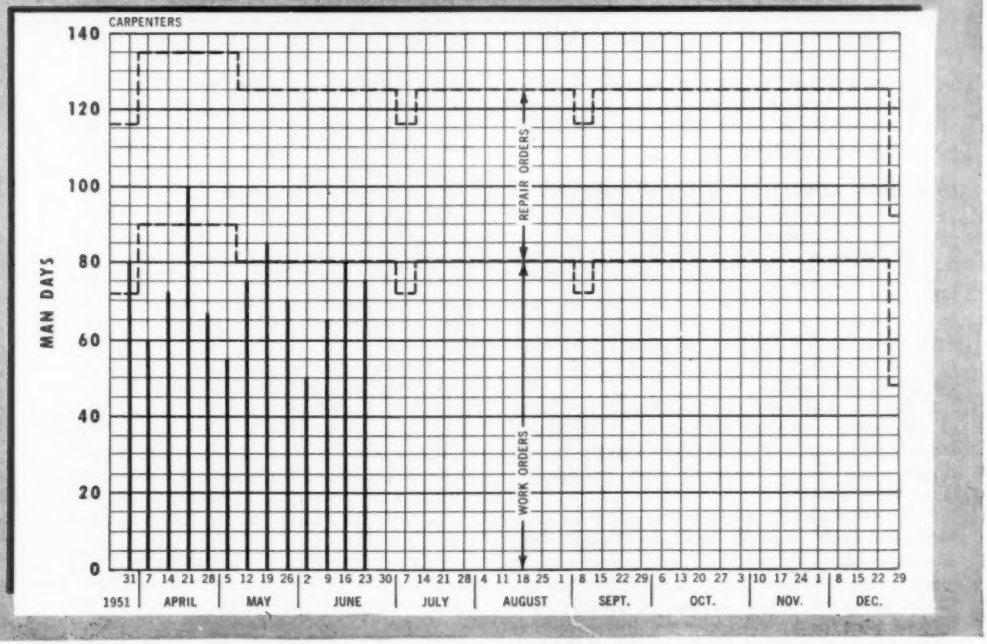
METHOD OF SCHEDULING · Work orders received by the C&M division are held in a file in the office of the superintendent of construction and mainte-

WEEK ENDING _____

WORK ORDER	PROJECT	COORDINATOR	DESCRIPTION	701 CARPENTER	701 BRICK MASON	701 CONST. WORKER	701 LABORER	702 PAINTER	703 CARPENTER	703 LABORER	711 ELECTRICIAN	712 PIPE FITTER	713 MILLWRIGHT	716 AIR CONDITION	719 SHEET METAL	721 MACHINE SHOP	% COMPLETED	CARRIED OVER	C N X
4097	1349	Moore	Bldg. #7 - Pour concrete floor	10		30	15												X
5166	1501	Phillips	Bldg. #8 - Install conveyor						20	4	6		15				60		✓
3847	1287	Loggins	Bldg. #6 - Replace oil reservoir tank									20	10				45		
5690	1400	Trivett	Bldg. #12 - Paint partition 2nd fl.					14									90		✓
5691	1578	Byerly	Bldg. #5 - Install											5	12	4			X
4235	1579	Woods	Bldg. - Change area wall		10		5										65		
4366	1601	Brittain	Bldg. #3 - Overhaul S&M Mch.						14	6	13	6							
			TOTAL MAN-DAYS SCHEDULED	122	50	196	135	60	70	24	83	100	62	20	130	60			
			AVAILABLE MAN-DAYS W.O.	120	50	200	135	60	80	30	76	110	60	30	120	60			
			AVAILABLE MAN-DAYS R.O.	50	10	40	60	20	45	25	60	40	50	10	80	70			

WEEK ENDING _____

WEEKLY SCHEDULE, kept a year ahead, compares the maintenance workload with available manpower. It lists only large work orders. This total is kept as near to available man-days as possible. The small repair orders balance the slack or overload.



WORK LOAD GRAPH shows trend of maintenance workload at a moment's glance. One graph is kept for each craft. The dotted lines represent available man-days for large work orders and small repair orders. Heavy bars show total man-days scheduled.

nance. They are not given to the craft foremen until the week before the work is to begin. The week a project is to be started is determined by three factors:

1. Needs of the production departments. Usually this is known when the order is written. Good liaison between the coordinator and production heads keeps the C&M executive well informed.

2. Availability of material. If necessary, material in stock is allocated to a job. On purchased material no job is scheduled until a delivery date promise is obtained. From that point on the coordinator watches delivery.

3. Availability of craft manpower. Here's where we use our two forms, the scheduling chart and graph, to help work scheduling.

Weekly schedule · This is a letter-size printed form covering all crafts, one for each week. It is kept in a three-ring notebook in the C&M superintendent's office for 52 weeks ahead of the current date. Before a job is scheduled, the superintendent looks at these charts to see if there will be sufficient manpower available.

As each new job is scheduled, the project is added to the list in pencil, showing the man-days needed from each craft. The "total man-days scheduled" at the bottom of the form is adjusted for each entry. In no event is it allowed to exceed the sum of available man-days (1) for work orders (WO) and (2) repair orders (RO) immediately below it.

Determination of available man-days · The philosophy of this determination is important. Each of our crafts performs plantwide work on the following types of orders:

1. Standing orders for repetitive maintenance.
2. Repair orders and other small jobs costing less than $300.
3. Work orders for large jobs.

Since we try to maintain the same size working force at all times, we arrive at the breakdown of available man-days for each type of order from an *average* of the distribution of these types of orders for the previous year. But in scheduling maintenance work we don't consider that portion allotted to standing orders as available. Thus we don't let work orders jeopardize preventive maintenance and routine upkeep.

Work load graph · Purpose of this form is to give scheduling engineer a bird's-eye view of trend of manpower requirements for each craft. One graph is kept for each craft in the same binder as the weekly schedule.

The dotted lines on this graph show available man-days. They are plotted at the beginning of each year as determined by the average method just described. Peaks and valleys represent extra time or holidays. Vertical distance from bottom of chart to lower dotted line shows man-days available for work orders. Vertical distance between lower and upper lines shows man-days available for repair orders.

Whenever a work order is scheduled on a weekly chart, the equivalent man-days are added to the vertical line on the graph. This graph shows total quantities only, not individual work orders. These quantities are the same as "total man-days scheduled" on the weekly schedule.

We do not show repair orders on the graph. This is in line with our belief that foremen can "fit them in" better than we can schedule them.

Do we ever schedule work orders above the lower dotted line? Yes, because in allowing ourselves such flexibility we get more efficiency. Some weeks the total of scheduled work orders will top the dotted line. Other weeks it won't, so the load averages out. But we know that if the totals top the dotted line too many times, and too far ahead, we have to increase available manpower or reschedule some of the work orders. The work load graph shows up any needed adjustments at a glance.

Weekly scheduling meeting · Each Thursday at 2 p.m. the top craft foremen meet jointly with the chief engineer, the C&M engineers, and the coordinators to discuss the work scheduling for the coming week. They are given a blueprint copy of the weekly schedule for the coming week, also the new work orders.

From the extreme right-hand column of the schedule the foremen can quickly tell which orders are new (by a cross) and which orders must be completed during the coming week (by a check mark).

We use the first part of the meeting to discuss the current weekly schedule, to determine if all the work will be performed as scheduled. If not, incomplete work is carried over to the next week's schedule. In the second part of the meeting we discuss the coming week's schedule and explain the new work. Also, supervisors get any extra information that will help them in their jobs.

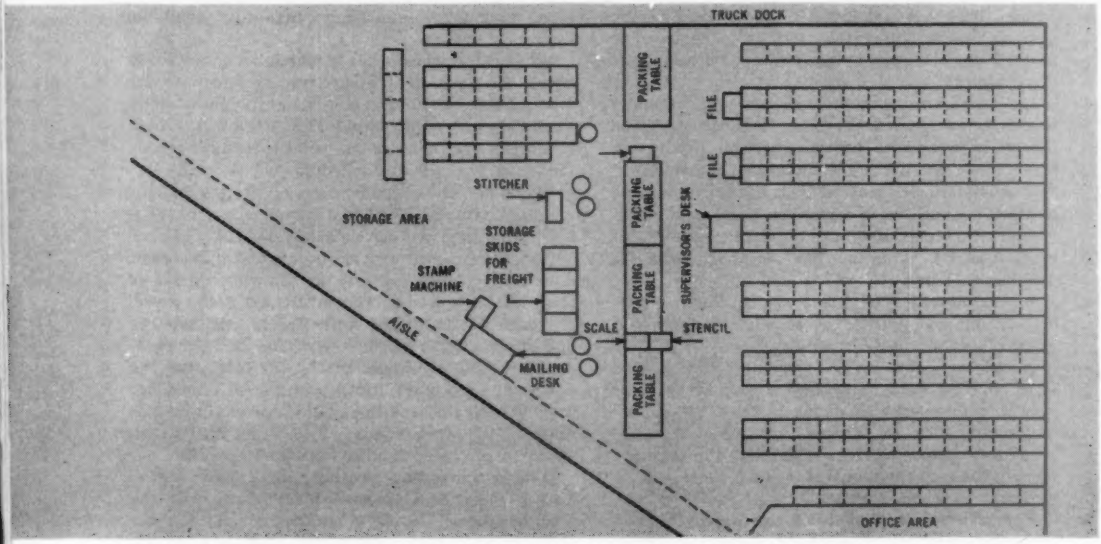
Weekly progress reports · Supplementing the chart and graph, we develop reports on our tabulating machines for our craft foremen which show by craft the man-hours allotted and those used to date for each work order. Man-hours are used here instead of man-days because time is so reported on time cards.

These reports are issued at the scheduling meeting. There is also a general report for supervisors and coordinators which shows the progress of each project by total man-days.

* * *

To sum up: Systematic planning and scheduling as just described helps keep the engineering department and its crafts working at top efficiency. It assures economic execution of the work. It keeps production going without costly delays.

A 20% SPACE-SAVING IDEA

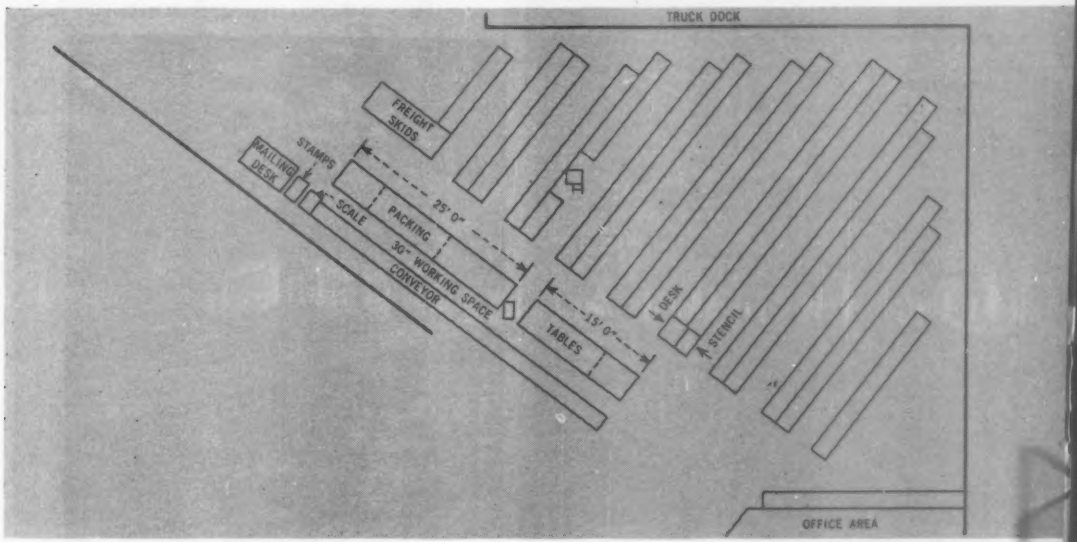


BEFORE • Stock storage and shipping area for steam and hot water specialties at The Trane Company was laid out as shown in the schematic diagram above. A packer-order filler gathered the stock for his order from the storage rows (there were 20) often making separate trips to each row. He carried the stock by hand to the packing table and closed the boxes at the stitcher. After weighing and stenciling the order, he carried the package to the mailing table or to a pick-up truck.

A 50% SPACE-SAVING IDEA

BEFORE • Storing unit heater fans used to eat up space. Finished fans were brought to storage in toteboxes by fork truck. Fans remained in the boxes until shipped. Boxes took up space. Fans were hard to reach. Sometimes blades were bent.

AFTER • Storage racks are made of steel rod welded to pipe frames. Fans are hung on rods according to size. Fans don't get damaged. They're easier to reach. Inventory is easier too. Method saves about 8 man-hours a week, cuts space 50%.



AFTER • Rearranged bins now put stock in one area, close to the packing table. Stock is gathered from bins on a mobile table. As clerk fills each order, he brings stock back to the packing table, where packers assemble and box the orders. Conveyor moves package to automatic weighing and postage station. Since the floor was rearranged, production has gone up, so savings are hard to estimate. But the increased production is being handled by the same number of people as before.

CASES IN METHODS IMPROVEMENT

THE TRANE COMPANY, LA CROSSE, WIS.

Six Storage-Space Savers

By ROBERT GALLOWAY
Assistant Manager, Production Control Department
The Trane Company, La Crosse, Wis.

OUR DRIVE FOR BETTER METHODS at Trane uncovered space we never knew we had—and plenty of production cost-corners to cut.

And Trane products—heating and air conditioning equipment—haven't suffered one bit with the company's step-up in production.

We added about 76,000 square feet of factory space to meet the hiked production schedules last year. But we added something else that will pay even bigger dividends in production and cost savings. This was Trane's formal methods improvement program.

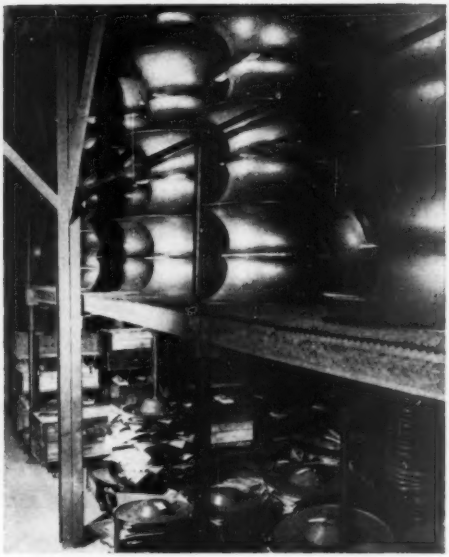
We tossed the whole program into the laps of our foremen and assistant foremen just last fall. The boys came through. They came up with ideas that really made the program click. We've saved space, cut waste, cut the time and labor on jobs all through our plant. And we've done it without lowering our quality tolerances one fraction. In several instances we've even improved our quality standards.

Just about seven meetings was all it took to get the program rolling. By the seventh meeting the men were in the habit of looking for cost-corners to cut, for ways to save time, space, and materials. They found them, too.

So far we've adopted, on the average, about one out of every four of their suggestions. And our cost and production curves are healthier today than they've ever been.

Turn the page

SHELF-RACK STORAGE prevents damage to metal or paint on finished casing panels in storage. They used to be stacked one on top of the other. Panels were scratched and bent. Now Trane stacks to the ceiling, saving about 75% of floor space.

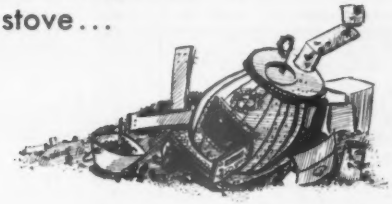


STORAGE BALCONIES practically double the storage space available for storing centrifugal fan parts. There's no damage to the parts, and they are easily reached to fill orders. Balconies were made of expanded-metal grilles and pipe.

PORTABLE STORAGE BINS now put nuts, volts, washers, and other small parts within arm's reach of the assembler. Upper and lower trays hold larger parts and tools. This new small-parts storage system saves at least 10% in working time.

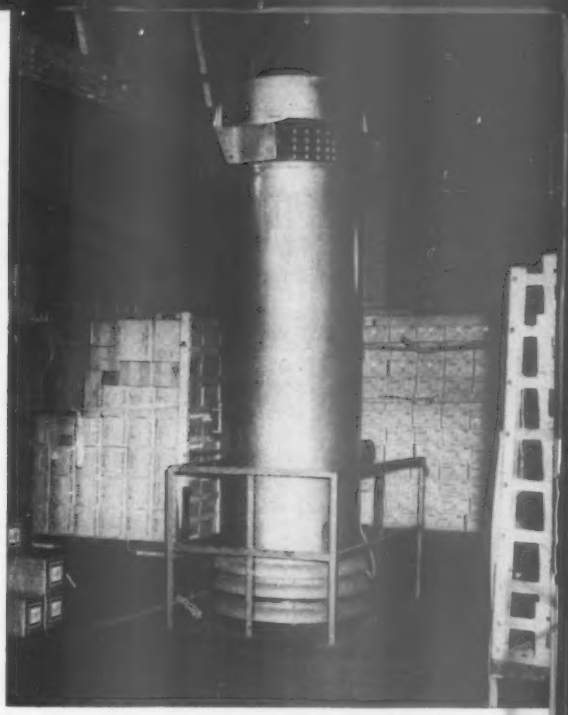
STACKABLE METAL STORAGE BOXES (rear) hold 200% to 300% more headers than the old wooden ones (foreground). Old boxes cost 10% less, but new ones take up less space, save $115 per year for every 300 square feet of storage space saved.

National Biscuit tossed out an old pot-bellied stove...



...and installed a modern space heater to get...

Warehouse Warmth at Low Cost



KEEPING A WAREHOUSE COMFORTABLY WARM in winter is a tough problem—too tough for a pot-bellied stove to solve. That's why National Biscuit Company, Gary, Ind., replaced its old stove with a heating unit built to do the job right. And NBC found that it got not only the desired results, but also seven unexpected — so thrice-welcome — dividends.

OLD STOVE NO GOOD · Frequent opening of doors placed a great strain on the stove. Especially during extreme cold spells. With the drafts wide open, the area closest to the stove was unbearably hot. At the same time, the wall areas of the 80x88 cracker warehouse were very cold. The hand-fired stove always neded lots of attention, too.

NEW UNIT CHOSEN · Company engineers studied all types of heating systems, finally decided on the Model 550 oil-fired Thermobloc. Here's why:

- It could be installed for less than $2000, as contrasted with bids for other equipment that ran as high as $4800.
- It required less floor space than other conventional heating plants. Dimensions: 32 inches in diameter by 10 feet high.
- It was built to put the heat where needed. The unit draws in cold air at the floor level, warms it to 165 F., and discharges it at the top of the unit. Discharged air spreads out at 1500 feet per minute just above the level of the working area. Air intake at the base of the unit sucks this blanket of warm air downward, thus circulating heat in the lower working zone. It's not lost at the ceiling. You regulate temperature with a thermostat mounted near the bottom of the heater.

The new unit is rated at 550,000 Btu. on 4½ gallons of No. 2 fuel oil per hour.

ACTUAL RESULTS · The building is comfortable at all times. With the truck entrance only 30 feet from the heater, there's an even temperature in the building. It ranges from 52 F. at the most distant spot from the heater to 60 F. in the areas surrounding the unit.

UNEXPECTED DIVIDENDS · We got seven worthwhile benefits we hadn't counted on.

- **No interference** with truck traffic in the building.
- **More room for storage** since the minimum space requirements of the new unit left room for storage of additional stock.
- **No rehandling** of orders since they can be worked in any part of the warehouse.
- **Easy adjustment** of temperature to suit needs of both stock and workers.
- **No damage to stock**—either from freezing in far corners or melting of chocolate covering on cookies close to heater.
- **Automatic control** that keeps the warehouse at safe temperature over week ends.
- **No fire hazard,** as there was with the stove.

ANALYSIS OF PERSONNEL CONFERENCES

JAN. 1, 1947 – AUG. 1, 1951

PRIMARY REASON FOR THE MEETING (Subject)	MAJOR ACTION TAKEN (Disposition)						
	TOTAL	WARNING	TRANSFER	PROBATION	TIME OFF*	OTHER	QUIT
Inefficiency	241	71	94	42	4	8	7
Absenteeism	219	170	5	3	14	1	3
Running or passing scrap	94	50	24	1	13	1	1
Dissatisfaction	40	6	10	1	—	17	4
Poor work attitude	38	28	3	1	1	1	—
Insubordination	37	25	4	—	1	—	1
Tardiness	31	23	4	—	—	—	—
Inability to get along with other employees	24	15	6	—	—	2	1
Falsifying reports	24	8	—	—	—	1	—
Reporting for work intoxicated	23	10	—	1	5	1	—
Request for job change	23	—	14	—	—	9	—
Sleeping on the job	18	9	2	—	4	—	—
Horseplay or arguing	17	15	—	—	1	—	—
Leaving work station	16	8	—	—	1	—	4
Fighting on company property	13	—	—	—	3	—	1
Pilfering	10	3	1	—	4	—	—
Quitting early	9	8	—	1	—	—	—
Tampering with machine	5	4	—	—	—	—	—
Garnishments**	4	3	—	1	—	—	—
Refusal to perform work to job description	3	1	—	—	—	1	—
Violating rules for leave of absence	3	1	—	—	—	—	—
Keeping another employee from working	3	3	—	—	—	—	—
Other	56	19	6	3	3	16	2
TOTAL	951	480	173	54	54	58	24

*Ranged from 2 to 60 days.

**There were only four actual meetings on this subject, but there were many instances where the problem was dealt with by personnel men.

This analysis of 951 personnel conferences shows...

How Shop Mediators Salvage Wayward Workers

By MILTON M. SHERWOOD, Factory Employment Manager, Thompson Products, Inc., Cleveland

They're *really* mediators—not counselors.

Their job is to help foremen salvage good workers who have slipped.

Practical? Sure is, says author Sherwood.

In all of 1951 there were only four grievances. And in 4½ years over 88% of all cases have been settled short of termination.

TERMINATION
15
23
4
2
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108

THAT EVERYDAY PHASE, "let's sit down and talk things over," implies anything from a marriage proposal to a wage contract negotiation. At Tapco Division of Thompson Products it usually means just one thing—a special type of personal conference for errant employees.

Between January 1, 1947, and August 1, 1951, there have been 951 such conferences (see analysis at left). They always include the errant employee, his foreman, and a "mediator"—one of four personnel supervisors. In addition, a union representative joins the group when requested by the employee.

MEDIATORS · Key man in these conferences is the personnel supervisor. He's not a counselor, as that term is usually understood. He's actually a mediator. His job is to help salvage good employees for further useful work at Tapco. It's our concept of good human relations that employees deserve every break Tapco can give them.

That doesn't mean that Tapco's personnel policies result in pampering. It does mean that each employee finding himself in hot water with his management gets a chance (often several chances) to receive the personal guidance and help he needs. And sometimes a huddled group comes up with the fact that a foreman, or the standards department, or management itself needs correcting, not the employee.

But let the record speak for itself. At the left is an analysis of the 951 meetings. Note that workers were terminated in only 108 cases. In each case the offense had been serious enough to warrant termination, or termination came after continued failure by the employee to fall into line.

Another analysis, not shown in the table, concerns the number of meetings needed to settle a given problem. In a sample 2-year period, 76.8% of the cases required but one meeting. Only 15.8% required two meetings, 5.4% needed three meetings and 2% needed four meetings.

Particularly interesting is the fact that a large portion of these meetings were held with relatively new employees. In the Valve & Jet Division of Tapco, which sponsors the meetings, employment has nearly doubled in the last five years. So the meetings have helped to bring those new employees up to standard for the organization.

MEETINGS · When a situation arises a foreman can't cope with, he asks that a meeting be held. A personnel supervisor arranges date and time. These supervisors are experienced men who have come up through the ranks. Most of them have had shop experience at Tapco.

The meetings are generally held in a closed room in the personnel offices. The room has full partitions and frosted glass windows for complete privacy. If the employee involved wants union representation, he asks for and gets it.

The group is limited to the principals involved. And it's conducted on an informal and friendly basis, with the personnel supervisor moderating. Meetings often last an hour.

When a problem has been presented clearly and in its true perspective, it is openly discussed. The personnel supervisor insures fair play. After discussion, the action that should be taken is usually clear to all present.

RECORDS · Carefully maintained records of the meetings, minutes, and case dispositions have helped Tapco get the most for its money from these rather expensive and time-consuming meetings. For example, the company learned from records in 1949 that its job instruction, training, supervision, and personnel activities should be aimed at reducing scrap. In 1951 the picture changed. Absenteeism became the big problem, with inefficiency running a poor second.

In other words, well-kept records have given the company a tactical tool for diagnosing and treating current trends in the shop.

Good maintenance alone won't guarantee maximum belt life.
You've got to buy (1) the right belt for the materials handling job.
And you must (2) install and (3) operate it properly.

A mistake in any of these three factors may cost you plenty of dough.

This article will point out some do's and don't's any belt manufacturer will endorse as sound advice on conveyor belt selection and care.

How to Get the Most Out of Your Rubber Conveyor Belt

By FRED MATHEIS • Assistant Vice President
Thermoid Company, Trenton, N. J.

PICK THE RIGHT SIZE AND KIND

YOU CAN BREAK THIS PROBLEM DOWN into two parts. First, you have to get a belt of proper size and strength for the mechanical load. Second, you need to choose the most suitable type and cover to handle the material and to resist wear.

But, even ahead of that, you ought to know the fundamentals of rubber conveyor belt construction. There are many different types of belts, standard and special. But, regardless of maker and application, construction is basically the same.

Every belt has a carcass and a cover. It's in the choice of materials, weight, thickness, width, strength, and other properties where you can profit or err in getting the right belt for the job. There is no such thing as an all-purpose design.

CARCASS CONSTRUCTION • In a standard belt the carcass is made up of one or more plies of various weights of cotton fabric duck. The warp (lengthwise) threads of the duck are woven over and under the filler (crosswise) threads. This gives the belt an elastic quality in the direction of travel.

The warp threads provide the primary strength of the belt. Duck is specified by the weight per linear yard (42-in. width), such as 28, 32, 35, 42, or 48 ounces. As a rule, 28-oz. duck is used in belts not over 30 inches wide. The heavy 42- or 48-oz. duck is used where belt tensions are high.

Where long belts are required, rayon duck or rayon cord is often used to impart extra tensile strength. Steel cable is sometimes used to strengthen belts where pulley distances have run into thousands of feet.

When a belt is subjected to severe flexing, it is best to buy one that has what is known as "skim" between the plies. This is a thin sheet of rubber that minimizes rubbing and wear of the plies as they bend. Skim has no effect on belt strength.

Usually each ply of belt carcass extends completely across the belt. But there is a special "step-ply" type that has added duck plies at both sides. Belt thickness is uniform, however, because of a thicker cover in the middle. This type is designed for extreme wear, as in handling abrasive materials.

COVER CONSTRUCTION • Covers are compounded of natural and synthetic rubber stocks. Other chemical ingredients also are used, according to the service of the belt.

Standard belts have smooth surfaces. You can order a molded belt with any surface you need.

Covers are made in various thicknesses to resist such causes of wear as abrasion, heat, cutting, and gouging. When belts are intended for severe service, it's wise to get one with a breaker strip under the cover. This is a ply of open-mesh fabric that increases cover adhesion and resists separation of the cover from the carcass.

Usually the top cover of an industrial conveyor belt is thicker than the bottom cover because it sustains most of the wear. In severe abrasive service, however, there is a trend toward use of thick bottom covers, too.

The edges of a belt are always carefully sealed in manufacture to keep out moisture. If moisture gets into the plies, it leads to mildew and rot. And if the water freezes, the ice particles will gnaw at the belt as it flexes, and will soon destroy it.

DON'T MISS THE BOAT ON BELTS

If you think of a rubber conveyor belt as useful only to move materials from "here" to "there," you may be losing out on some of its important benefits.

Conveyor belts can move materials continuously and automatically any distance through a plant or process. They can take materials through extreme ranges of temperature and humidity. They permit conversion or assembly of the product on the way.

Here are a few applications to think about. They suggest ways for industry to save money—such as direct costs of handling materials, improved methods, better quality product—in fields where conveyor belts were not the evident solution before:

Cooling pineapple cans • Our company recently designed a special belt for the pineapple industry. It's used to cool hot cans of pineapple. The surface of the belt is molded with alternately projecting lugs. These lugs cause the cans to tumble and roll as the belt travels upward in a stream of water. In the 5 minutes it takes the cans to travel 200 feet, they are cooled from 195 degrees to 90.

Replacing plant railroad • At the new Fairless Works of the United States Steel Company, proudly announced as "The Steel Plant of Tomorrow," rubber belt conveyors will be used for handling bulk materials differently than ever before in the steel industry. In one instance they will do away with conventional intra-plant railroad handling.

Eliminating egg breakage • Problem of handling fragile eggs in processing was solved by using a special conveyor belt with a soft sponge-rubber top. It's used elsewhere for conveying light, delicate pieces.

WHAT SIZE BELT? Now we're ready to talk about picking the right size belt. You have to examine the rate at which the material is to be moved, the distance, and the horsepower required to move the loaded belt.

Rate of movement • This influences choice of belt width and speed. A belt half as wide but running twice the speed of another will move the same amount of material. So you are faced with an important decision, because the wider the belt, the greater its cost. However, the faster the belt runs, the more often it passes the loading point. This means more wear and greater maintenance. Experience has proved you don't save by running a narrow belt too fast. On the other hand, your initial cost may be too high for a very wide belt running at slow speeds.

There are other *pro's* and *con's*. A high-speed belt requires more expensive rollers. A wide, slow-speed belt takes longer rollers, which may be just as expensive. High-speed rollers need more maintenance. It's easy to see there are many factors to consider.

So you have to figure out the break even point between width and speed for each installation. Your design engineer or belt manufacturer is equipped with engineering data on these factors to help you choose the belt width and speed that will give you the most for your money.

Other calculations • After you have decided on belt width, it's a straight engineering job to calculate the horsepower needed to drive the loaded belt. All the big belt manufacturers have charts and tables to help derive the answer. You may have to "cut and try" when you find the first belt width impracticable, and start again with calculations on a wider, slower belt.

From the horsepower required you calculate the maximum operating tension you require in the carcass of your belt. Again you refer to belt engineering tables to determine the number of plies you need for the type of fabric you have chosen.

Here are some guides: A well-proportioned belt has enough plies to support the load and withstand tension. You have to be sure it will be flexible enough to trough or bend over pulleys without overstressing. In general you will find that the minimum-ply belt that supports the live load also satisfies tension requirements. If the belt travels flat over short distances, it runs below tension capacity.

Best advice I can give you is to work closely with the belt manufacturer in all engineering calculations. Satisfy yourself that you're getting a proper balance in cost and service in the size you finally select.

These pointers will help you get that balance:

- Heavy lump materials require body in the belt, hence it pays to use heavier duck than the bare theoretical calculations call for.
- Number of plies is decided between the minimum requirement for supporting the load and the maximum allowable for troughing.

WHAT TYPE BELT AND COVER? The life of any conveyor belt, you may have heard, is in the cover. That's only true, of course, if you've also chosen the right size.

Choice of cover depends upon the physical properties of the material it is to handle, and upon the service and exposure it will undergo. For example, a belt handling large, heavy, and sharp fragments should have a thick cover, a breaker strip, and

several plies with skims. Light, fine materials can be moved on a less rugged belt. Abrasive materials may require a heavy cover, despite small particles.

Temperature is important, both of material and environment. You can get belts designed for both hot and cold materials that will be worth the extra cost for such conditions.

Moisture content of material also influences cover design. Wet and dry mixtures need different covers.

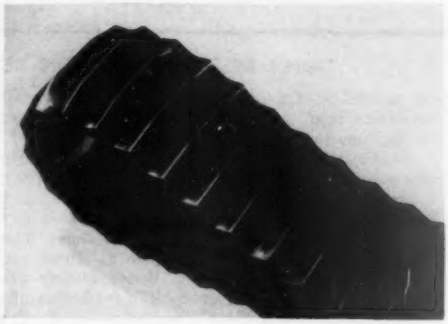
Don't overlook shape of cover. Special molded belts may solve a tricky handling and conveying problem.

UNUSUAL PROBLEMS • Here are some stickers that industry has solved by use of special covers:

Odor • The canning industry uses a white, acid-resistant cover that does not impart odor or taste to the food. This belt can be easily cleaned to prevent the accumulation of food in the belt pores.

Heat • A special belt with a glass fabric carcass and a heat-resistant cover operates in temperatures up to 350 F. A ply of asbestos under the cover gives extra insulating properties. Such a belt is used in foundries, chemical and cement factories.

Color • In a citrus fruit-packing plant, inertia and nausea among workers along a conveyor belt was traced to the belt color. The cover color was changed to peach. It proved so successful that several other colors have been made available.



Shape • A metalworking plant uses a molded belt with transverse troughs for carrying short rods, bolts, and other cylindrical parts (above). Some other plants use a flanged-edge belt which has raised edges to prevent material from sliding off.

In choosing your belt cover, check these points:

• On short, high-speed belts, it pays to use heavier and better quality covers to offset the faster wear and tear.

• The frequency with which a point on the belt passes the loading point is a direct factor in deciding the gage and quality of a belt cover.

• Look carefully at any worn belts you are replacing. They are a clue as to how you might improve the replacement.

INSTALL AND USE YOUR BELT RIGHT

HOW YOU HANDLE A CONVEYOR BELT from the moment it leaves the maker's plant determines in a measure how long it will last you. You can shorten its life even before you start to use it.

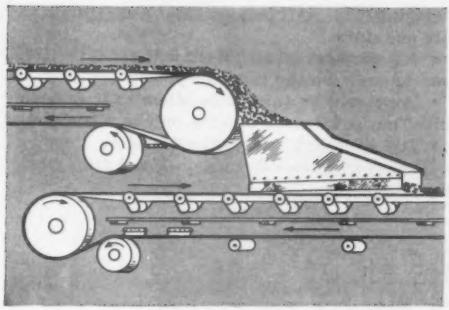
PREVENT HANDLING BREAKS OR BRUISES • When your new roll of belting arrives, never drop it off a platform. Skid it off, roll it off, or lift it off. A large belt weighs several tons. Impact of a fall will weaken the side that hits the ground. If the roll falls on a stone or tool, you may get a cut.

INSTALL BELT CAREFULLY • When setting a heavy belt roll in place for installation, handle it like a crate of eggs. Best way is to mount the reel on supports so that it is centered with the conveyor and square to the line of travel. As you unreel the belt and thread it over pulleys and idlers, avoid sharp bends or twists. Protect the belt from sharp or rough surfaces. Don't pull the belt too hard—work it in gradually. Your belt isn't designed to withstand abnormal tension. Before starting a belt, check its whole length to make sure there are no obstructions to free movement. Look out for tools left on the return side.

USE PROPER SPLICE FASTENERS • The "endless" fastener joint is the weakest point in your belt. Your belt maker will tell you what fasteners you can use. Usually the staple type are OK for thin belts in light duty. For medium or thick belts in heavy-duty service, the plate type is usually satisfactory. Be sure to seal the cut ends to keep the carcass dry. Vulcanized splices are best of all—a "must" where belts have high stresses or speeds.

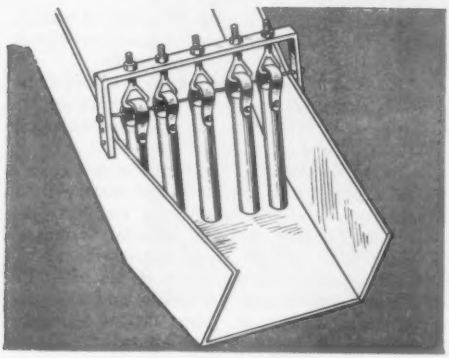
CHECK PULLEY AND IDLER ALIGNMENT • Misalignment of pulleys or idlers will cause "edge wear" and abnormal surface abrasion. All the time and trouble you take to get perfect alignment will pay off in increased belt life. Make sure the centers of all carriers are in a straight line, and that their surfaces are square to that line and in the same horizontal plane. Use a transit for best results.

PROVIDE PROPER LOADING CHUTES • You can wreck your belt most quickly at the loading point. It is here that the material does most of its gouging and abrading. If you want long belt life, strive for ideal loading conditions. In an ideal chute the material falls on the belt while moving in the same

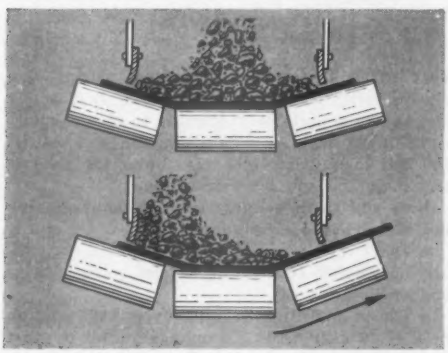


direction and at the same speed as the belt (above).

Proper loading involves several precautions in design and operation:



1. Pitch the chute to get proper loading speed. If you can't adjust the slope of the chute properly, install a baffle of iron or wooden bars inside it. The baffle is hinged at the top, and cuts the speed of the material.



2. Feed material to center of belt, not to one side. Material falling on left side will make the belt ride out toward the right, and vice versa. This leads to edge wear.

3. Cushion the impact of lumpy material with a prelaid layer of fine material. You can do this by installing a screen or "grizzly" at the bottom of the loading chute. In some instances an oval or "fish-tail" notch cut in the lip of the chute will aid in prelaying the "fines."

4. Keep vertical loading distance between chute and belt to a minimum.

5. Prevent loading directly above a solid pulley. Such hammer-anvil action will quickly spoil the belt. Locate the chute so that the material will strike the belt between idlers. Where you are loading heavy material, you may have to provide rubber-covered or pneumatic idlers directly underneath the loading point.

6. Squelch belt vibration that is caused by impact load between idlers. The resultant chattering may depress the belt sufficiently to allow material to escape under the skirt boards. This invites extra belt wear. You can prevent this by locating the chute far enough ahead of the tail pulley to allow insertion of at least one belt-steadying carrier pulley. It's a good idea, too, to space carrier pulleys more closely around the loading zone.

7. Construct skirt-boards to minimize spillage and belt wear at loading point. The boards should be long enough to settle the material before it leaves the area. Space boards half a belt width apart for free-flowing material, 2/3 of a width apart for sluggish material. Position the boards about 2 inches above the belt, but not touching it. Fasten the boards so they can't get loose and drag on the belt. Provide flexible skirts made of belting remnant at the bottom edges of the boards. Place the skirts so that the rubber-sealed edge is nearest the belt, to prevent abrasive grit collecting in the fabric and grooving the belt. Also arrange the skirt so that the space between the belt and edge of the skirt gradually increases toward the discharge end of the chute. Thus any wedged-in lumps will quickly work free with the forward motion of the belt.

KEEP MATERIAL AWAY FROM PULLEYS · Even in the best installations some material falls off the carrying surface of the belt. If it lands on the return side of the belt and is allowed to stay there, it will squeeze between the belt and pulley. Severe damage may result. Some plants use brushes and scrapers to clean off such spillage. The best answer is to cover the return side of the belt with a wooden or metal deck.

PROTECT BELT FROM SUNLIGHT · For a permanent outdoor installation it will probably pay to house the conveyor in a wooden or steel structure. Sunlight speeds oxidation of rubber and loss of elasticity and life. One company has gone so far as to provide a long, continuous Quonset hut which

is heated in winter. *If you place a belt in storage, put it in a dark, cool, dry place.*

Now check your operations for these extra pointers:

• Adjust belt take-up only enough to prevent slippage of the belt, and thus minimize chances of undue strain.

• It's better to shorten your belt a second time after it stretches beyond limit of take-up than to overstrain the belt because you want to make only one splice.

• A good check on alignment is to see if the belt runs squarely on the tail pulley.

• Don't rely on side-guide idlers to train your belt. They're intended to serve only as a backstop.

• Try to unload your conveyor before stopping it. That avoids undue strain on belt and drive when restarting.

GIVE YOUR BELT THE RIGHT CARE

THE RULES FOR BEST MAINTENANCE of a conveyor belt call for periodic belt inspection, scheduled lubrication of equipment, and quick and proper repair of belt damage. If possible, arrange to have one man (with assistants, if necessary) responsible for belt upkeep. It's no job for an amateur.

Some companies using many thousands of feet of rubber belting have a well-equipped repair shop. It contains portable and permanent vulcanizing equipment, belt tables, and drying racks.

HOW TO MAKE BELT INSPECTIONS • In large installations, inspect belts every day. Here are points to be checked:

1. **Tension of belt** • Too much slack means slippage, and slippage means wear. If belt is too tight, however, a sudden load might overstrain it and rupture it.

2. **Condition of belt** • Watch cover for gouges, cuts, breaks, or edge wear, and ascertain cause. Remove all oil or grease with a solvent.

3. **Splices** • See if any are open or torn.

4. **Belt alignment** • Check every 1 to 3 months—misalignment is the chief cause of edge wear.

5. **Conditions of pulleys and idlers** • Check for lubrication, cleanliness, and free-rolling. If return belt has no protective shield, check spillage brushes or scrapers.

HOW TO REPAIR BELTS • If the belt cover becomes damaged, repair it at once. Don't let exposed fabric carcass go untreated—it will quickly absorb and hold harmful moisture. In warm weather this results in mildew and rot. In winter ice crystals will cut the fabric. Either way you have a weakened belt.

Here are the methods for repairing various kinds of damage with hand tools:

1. **Worn edges** • Reseal worn or chewed edges with the new liquid neoprene compound now available.

2. **Worn spots on cover** • Use this same neoprene compound to build up worn spots. You will prevent need for more extensive repairs later.

3. **Long, deep cuts** • Open the cut and clean out all the dirt. Then cement the cut closed. Don't use the belt until it's dry.

4. **Torn cover** • Where carcass is only slightly damaged, remove the loose ears of cover stock by carefully cutting a curved and bevel-edged border around the spot. Sand the edges, and apply a patch flush with the belt cover.

5. **Longitudinal rips or gouges** • Clean the wound, sand it, and cement the pieces in place. Reinforce the cut with rip plates at 3-in. intervals.

6. **Transverse rips** • Treat the same as longitudinal, but use standard fasteners only. Don't use rip plates for transverse rips, nor standard fasteners for longitudinal rips.

7. **Holes** • Sometimes irregular holes do not permit the simple use of rip plates and fasteners. In such a case, enlarge hole into the smallest possible rectangle with its sides parallel to and at right angles to the belt edges. From a belt remnant cut a patch the exact size of the hole. Fit it in, and fasten it with rip plates and fasteners on all sides. Cement all joints. When necessary to prevent seepage of fines through belt repairs, remove one ply of fabric from a belt remnant and place it under the fasteners and rip plates.

Repair kit • An adequate belt repair kit includes cobbler's knives and sharpening stone, a supply of emery cloth, rubber cement, inner-tube patching rubber, rip plates and standard belt fasteners and accessories, and rags and gasoline for cleaning. Remnants of belts left over from installation are useful for patching.

VULCANIZED REPAIRS • Vulcanized patches are always better than hand-tool repairs. It may pay you to buy a portable vulcanizer to make repairs right in the field. As a rule, you can also call on the belt manufacturer or distributor for splicing and major repairs by vulcanizing.

Now add these pointers to your money-saving belt maintenance techniques:

• Don't replace a ragged belt too soon—it usually has enough reserve life to keep going without sudden failure.

• Check and tighten plate-type fasteners an hour or two after installation, again after the first week, then every month. They will hold much better and longer if you keep them properly tightened all the time.

American Vitrified Products Company
built its new concrete pipe plant . . .

. . . at the foot of a hill—and the . . .

Hill Saves Handling-Hours

IT'S GRAVITY FLOW for all raw materials in this new pipe plant at Valley View, Ohio. Trucks back cement, sand, and slag up the ramp at the left and dump loads into proper bin. From bins, 95% of the handling is by gravity. After pipes are formed and cured, they are moved by fork trucks to the storage yard at right.

Materials for concrete pipe—cement, sand, and aggregate — are usually hoisted by elevators to raised storage bins. It takes a lot of machines and man-hours.

But not at American Vitrified Product's plant. The company built it at the foot of a hill and the hill eliminates the mechanical elevating, saves an estimated 32 man-hours a day.

HOW GRAVITY DOES THE JOB · Trucks drive off the main highway on a road cut into the face of the hill. They back up the ramp—54 feet above the plant floor. Ramp is structural steel, mounted on concrete pilings. Cement goes into a 50-cu. yd. bin; sand and gravel into a 4-compartment, 198-cu. ft. bin.

From bins, sand and slag flow by gravity into the batch-weighing hopper. Cement is moved by screw conveyor. After batching, materials flow by gravity into either of two mixers.

One mixer feeds a pipe-making machine; the other, a pipe-casting process:

Up to this point, with the exception of the short length of screw conveyor, all mechanical and manual handling has been done by gravity.

After pipe sections have been formed — they range from 8 inches to 10 feet in diameter — they are moved by fork truck to one of five 20 x 100-ft. curing rooms. Curing with live steam takes from a few hours to several days.

After curing, sections are moved by fork truck to the temporary pipe storage area to the right of the plant building.

To test your reading ability . . .

Read this article at your normal rate of speed for general information.

Record your exact reading time in minutes and seconds. Then turn to page 282 and answer the 10 questions based on the article.

A DOZEN DO'S FOR . . .

Your New Attack on Handling

Elementary? Of course. But, the author says, it's time to accentuate materials handling—in a way that fits today's methods and problems. And here are the basic do's for such a program.

By H. C. CHRISTENSEN
Materials Handling Coordinating Engineer
Sylvania Electric Products, Inc., New York

THERE'S NO DOUBT ABOUT IT. Handling materials in our plants still costs too much. Sure you've done a lot to cut the cost. So have we. But we know there's room for improvement.

Trouble is, most of the cream has been skimmed off. Most plants have mechanized materials handling — to some extent, at least. I hear some fellows say there's not much opportunity left to make savings in materials handling. We don't think that's true. It's just that the opportunities are not so obvious as we might expect them to be.

For instance, it used to be easy to buy a fork truck or conveyor to save a lot of labor. Now most of us have at least some of this equipment. So we have to look for ways to use the equipment more effectively, or for better equipment to replace obsolete items. Also, we must broaden our approach to new applications of mechanized handling.

In short, the need to keep on cutting handling costs is obvious—to anyone trying to operate profitably today. Admittedly, it's not quite so simple today. So we think it's time to accentuate materials handling, but in a way that's realistic—in a way that recognizes today's methods and problems.

To put this new emphasis on handling we're realigning and enlarging the sights for engineers concerned with materials handling. Here's part of the program we've lined up:

1. Look everywhere for materials handling.

It's more than receiving, warehousing, and shipping. It's more than moving materials from one department to another. It's everywhere we find the "transport" or "storage" elements in plant or office processes. That means it's a part of practically all methods work, and often combined with "operation" and "inspection" elements.

Example • Removing a part from an operation jig on a work bench to a drop chute discard is "transport." That makes it materials handling. It might even be advantageous to mechanize this handling (in some instances) with a tiny 6-in. powered belt conveyor.

We believe the jig is the methods engineer's problem. But we also believe the materials handling engineer is usually more capable on the handling problems.

Point is, materials handling is becoming a high science in itself. The general methods engineer has tough problems of his own. The old view of the methods engineer's job appears ripe for a breakdown into at least two categories: (1) Methods covering machine jig, fixture design, and applications to the "operation" and "inspection" elements of the process cycle; and (2) Methods covering the handling problems in the "transport" and "storage" elements of the process cycle.

2. Make full use of every good idea.

The solution of one problem can often be applied, with modification, to other spots in the plant, or company. I think that's especially true of materials handling.

Example • A few years ago I was working on a handling project that had reached the report-writing stage. But the boss suggested we take a little more time to see if we could use the same basic idea we had developed elsewhere in the company. I didn't buy that idea readily. Seemed to me the other places were other problems that required separate study. But the boss won, and I'm glad he did.

In three days we found seven other operations, in three plants of the company, where this idea could be used. By including all the applications the economy of the proposal was much more impressive. Also, we saved engineering cost by doing eight similar jobs almost simultaneously instead of eight times.

3. Look to other industries for ideas.

To make television sets and other electronic products we don't use exactly the same processes that are required to make drugs. But many of the handling problems are the same, or very nearly so. (*That goes for many of the processing problems, too.* — Ed.)

Example • Palletization of radio tubes involves

the same basic principles and problems as palletization of shoes or canned vegetables. A better pallet for cans may be a better pallet for our products. A better method of making a stable pallet load of shoes may be just the idea we need to solve one of our problems.

4. Use motion pictures to study handling methods. The technique is another of the motion analyst's tools that is adaptable. One way to use it is for analyzing fast manual handling operations in the same way as films are used to study process methods.

Then there's another application that has possibilities. Many handling operations occur so infrequently that it's difficult for the engineers to visualize their details after seeing only one operation cycle of each. For that reason we often pass up some potential savings. Also, I believe some improvements in handling methods would have been even better if we could have studied the old methods in more detail in motion pictures.

Example • Take car loading. Some loads are received only once a month. There are different methods of unloading cars because of the material, type of container, equipment used, and so on. It takes time and repeated observations to get a clear understanding of an existing method. Motion pictures speed analysis of present methods because you can watch one operation cycle over and over if it's on film. You don't have to wait a month to see the operation repeated.

5. Keep up with what's new in materials handling equipment. It's not enough to know there are fork trucks, belt conveyors, tractors, elevators, and so on. Not only are there many classes of handling equipment. There are also many types within each class. Newly developed types of equipment appear frequently.

Today's concept of better materials handling methods is more effective mechanization. You've got to know the equipment to help you recognize where you can improve mechanized handling. Also, planning better handling around new equipment that's not the best available is time wasted.

Example • An industrial truck manufacturer brought out a new-model walkie truck that was a foot shorter than the prior model. But he kept the old model on the market. The shorter model could save aisle space in many situations. If we didn't know about the new model when planning a storage layout, we'd lose space-saving benefits.

6. Adapt standard equipment to handle your materials. It is nearly always less costly to buy and maintain than special equipment. We've found we can often adapt our plans to take advantage of that lower cost. Of course, if we think special equipment will be better, we propose it.

Example • If we need a belt conveyor to span the distance between two machines 13 feet, 8 inches apart, we can buy a standard 10-ft. or 12-ft. conveyor and a special length filler. That's cheaper than getting a special conveyor to cover the full span.

7. Ask for help to get the best method. The trend is toward more complex mechanization of production—and materials handling. That makes it tough for any one man to be an all-around expert. So it's no disgrace to ask for help from those with special knowledge. Never has been. But it's especially important today.

Important "experts" sometimes overlooked in the quest for ideas and advice are the men on the job — operator, mechanic, supervisor. Their intimate experience with equipment and work details will often save "learning the hard way."

Example • Five minutes with a warehouse supervisor can save you hours of pointless work with the warehouse inventory records. The records usually don't show the extreme fluctuations in inventory volume. Your warehouse layout and handling equipment plans, based on the records alone, may be completely impractical. Consultation will eliminate those mistakes.

8. Look for simple methods to solve problems. I said methods are becoming more complex. But that doesn't mean we have to use the *most* complex method — unless it's the best way.

Example • I remember an application of electric-eye counting that didn't work. Used to count packages, it was all right except that the maintenance man was inclined to tamper with the relays when all it needed was tube replacements. Then it really needed fixing.

Looking for a more fool-proof device, we tried a microswitch. We split the belt of the conveyor, adjusted the idler pulleys to keep the two sections of belt an inch apart. A counter-weighted arm, attached to the microswitch, extended up between the belt sections through a hole in the bed, high enough to be tripped by the packages. It worked fine. Best of all, the microswitch installed cost about $35; the electric eye cost $450.

9. Keep a project record that is complete. We don't *immediately* complete every materials handling improvement project started. But let's not start from scratch every time we pick up the job. A simple way to avoid duplication of work, and losing good ideas is to keep a project record.

Include in this record all the important facts

about the project. Show such things as the pattern of the development steps, location and description of data, conclusions drawn from data, progress and status, names of individuals who have participated.

Primarily, it's useful for refreshing your memory after you've been away from a project for a while. Or it helps a newly assigned engineer to pick up where another left off. I've found, too, it helps me to find a starting point on similar projects.

Example · An engineer had worked on one materials handling project a couple months. I know he had some unusually good ideas to solve the problem, but he hadn't reached the final plan stage when he left the job, and he didn't make a project record.

Quite a while later, another engineer tried to pick up the project to finish it. You can guess what happened. The good ideas couldn't be found. The new man had to start from scratch.

10. Check the "futures" for each idea.

That it's sound for present conditions just isn't enough today. Products, processes, and methods change too fast. A really good proposal for materials handling economy will be flexible enough to be adaptable to potential changes during the pay-off period, at least.

Example · I know a case of a proposal that saved $100,000 net a year, at an installation cost of $200,000. A two-year return looked good. The proposal was installed. Fourteen months later a change in the product made the handling setup completely obsolete. Its design made it inflexible to meet the change. A good saving became an $80,000 loss of investment.

11. Make a second survey of the problem.

When you start the project, gather facts, take measurements, make as many observations as you need. Then try to repeat the survey before you propose a solution. A survey of a reasonably complex materials handling problem usually contains so much information that you can't be certain you have all the facts, or have them right. An oversight of one item may seriously affect the value of your proposal. Review your solution in the light of your second survey to protect yourself against surprises.

Example · When an executive reviews a proposed improvement in materials handling (or any proposal), he'll ask questions. If the answer to any pertinent question is "I don't know," he'll probably table the proposal. Then you have to make the second survey anyway. And on the second presentation he's going to be tougher to sell.

12. Make your report sell the idea.

The best idea will never be effective if it can't be sold. Reports must be clear and "fast." Put the results up front. That's what the plant executive wants to see. Then you've got to prove that the proposal will work. Use drawings, photographs, and models if they're required to demonstrate the proof quickly.

Example · A few years ago an executive and I traveled 300 miles to a plant to get his approval of an experimental machine. We spent 20 minutes looking at the machine, during which time I explained its important points. Then we spent four hours observing other problems in the plant.

On the train going home he asked a lot of questions about that experimental machine. He didn't remember what he had seen, wasn't quite sure if it would work. A trip wasted.

Later, I made a motion picture of the machine in action—went the whole way on a visual aid. After the executive had seen the movie four times he understood the idea—and approved it.

It'll pay you to look in the back of the magazine for...

...Best Catalogs of the Month
Catalogs you can use on your job. Each month FACTORY brings you the best. See **page 138.**

...What's New in Equipment
Equipment that will make your job easier. A monthly trade show for operating men. See **page 148.**

...Practical Labor Relations
Hints on labor relations for *all* operating men—not just labor relations men. **Page 206.**

...Plant Engineering Problems
Tips to help you solve tricky maintenance problems. **Page 228.**

...Plant Operating Problems
You'll find answers to some of your tough production problems here. See **page 232.**

...You Mustn't Miss
Industrial news, hints, and quotes from business leaders. Lots of good, sound industrial ideas here. See **page 238.**

...Books and Booklets
Home reading to help you on your job. Here's a good guide to current books for the man who wants to get ahead. See **page 296.**

...Industrial Films
Lots of help here when you're planning your employee training program. See **page 304.**

...and 10 other departments
For a complete list, see table of contents on **page 2.**

A TOBY QUINT EPISODE

"—Just Like a Personnel Man!"

By RAY SHERMAN

Joel banged his desk. "Can't you make even one decision without those darned sheets?"

"LOOK, EDDIE!" Joel Bede, superintendent of Production B, shoved the personnel records away and banged his desk with his fist. "Can't you make even one decision without those sheets?"

Edward Lee, Central Manufacturing's worrier about industrial relations, exhaled a cloud of smoke and through it snapped: "You're *not* firing Dick Michel!"

"Aw, gnats!" Joel batted down the idea with his hand. "Are we running a factory or what? Why don't you issue merit badges and have eagle scouts?"

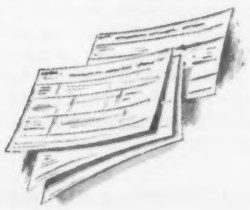
A smile began at Eddie's lips and slowly spread. He pushed a rating sheet back toward Joel. "Hasn't Dick Michel earned an eagle badge at Central?"

The super scowled at the record. Eddie reached for it.

"Dick Michel came to work here seventeen years, three months, eleven days—" Eddie glanced at his watch "—six hours, and eleven minutes ago. He took a cleaner's job. In all that time—" Eddie tapped the card "—there hasn't been one bad mark against him. He got to be a foreman. He's a good foreman."

"Yeah." Joel looked sad about it. "His record's all right."

"Now—" Eddie hitched closer to Joel's desk "—a spell ago we had to add some men. We took on Louis Kaye." Eddie picked up another card. "He's good, too. You want to make him a foreman."



"He's darned good!" Joel's face lighted. He—"

"So," said Eddie, "you want to reach up to the middle of the list and pull out Dick Michel to make room for a man you like."

Joel shrugged. "Dick's getting old."

"Aren't we all?" Eddie snorted. "Is that a crime"

"No, but—"

"Oh, come now, Joel." Eddie leaned back and smiled. "Trouble with some of you fellows is you don't look beyond the ends of your noses. You want a sweet-running plant. A machine you can chuck out if you want to and nobody cares. But it isn't machines that make a sweet-running plant. It's men!

"Take two plants, with the same machines. Fill one with gripes and the machines won't run right. Contented men can make them purr. So the Old Man and Toby Quint—than whom there is no better plant manager any place — ask me—" Eddie aimed a finger at himself "—to try to make Central purr.

"One by one I run down things that cause discontent. Finally I work out a system that the men agree is fair. And what happens? You don't want to play ball. You want to junk honest ratings. You want to ignore years of service. You might gain a wee bit of efficiency in that one job, but—" Eddie's eyes flashed "—fire Dick Michel and there wouldn't be a man on your side but Louis Kaye."

"Also —" Eddie made more smoke rings "—do what you suggest and in no time at all the air would be full of gripes and trouble and you'd come running to tell me what a punk personnel man I am. Joel—" Eddie grinned "—know why you called me in?"

"Of course I do!"

"You wanted," said Eddie, "to see if I wouldn't back you up on something you darned well knew you shouldn't do. There are times when a fellow has to sacrifice to win a ballgame for his team."

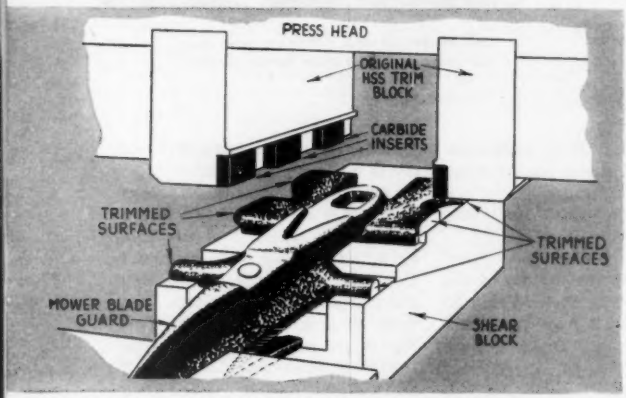
"Eddie—"Joel tried to hold his lips tight and not smile "—you talk just like a personnel man!"

OPERATING SHORTS

Radiant Heat Warms Workers' Feet

Warm floor in the cold room keeps packing room workers comfortable at the Cashmere Fruit Growers' Union, Cashmere Valley, Wash. Temperature in the packing room must be held at about 50 degrees. Before the radiant heating system was put in the floor workers complained of cold feet, were often absent because of colds.

Steam circulated through wrought iron pipes beneath the floor solved the problem for the workers, has little effect on the air temperature in the room.



Carbide Inserts Trim Steel Castings

Tungsten carbide inserts in trim blocks have increased tool life about nine times at Oliver Corp., Shelby, Ill. The blocks are used to trim flash from steel castings.

The original HSS trim block was ground away to make room for the carbide inserts. The inserts have a 1/64-in. supported overhang to allow removal of part before die head moves up again after the shearing operation.

The carbide inserts trim over 100,000 pieces between grinds, compared to 12,000 for high-speed steel. Little grinding is needed and there has been no sign of the cutting edges chipping under impact.

Visual Control Boards Give Production Data

Visual control boards have brought production control data out into the open at Karl Lieberknecht, Inc., Reading, Pa.

Forty-eight boards, each with space for 125 items, show an up-to-date picture of all jobs in process, finished stock, materials, etc.

The boards, in use since 1947, are maintained by half the time of two employees. The system is vital in maintaining production schedules. It also furnishes prompt answers for both management and customers on production on specific orders.

Air Cylinder Dumps Waste Carts

Waste carts are no longer dumped manually at Burroughs Adding Machine Co., Detroit. An air cylinder and cable hung on a welded frame do the job.

Two arms attached to the frame slip into special sleeves welded onto the sides of the waste carts. Then a double-acting air cylinder, attached to a cable that runs over a pulley on the frame, upends the cart to dump it, sets it down again gently.

This method might well be adapted to other materials handling operations.

Inclined Conveyors Feed Presses

Portable inclined conveyors automatically carry parts from one press to the next for successive operations at Toledo Stamping & Mfg. Co., Toledo. Production rate is 1150 parts per hour.

Parts are ejected from press by air, then slide down chute to the conveyor, which carries them upward toward the next press. There they drop into another chute that feeds them down to the operator.

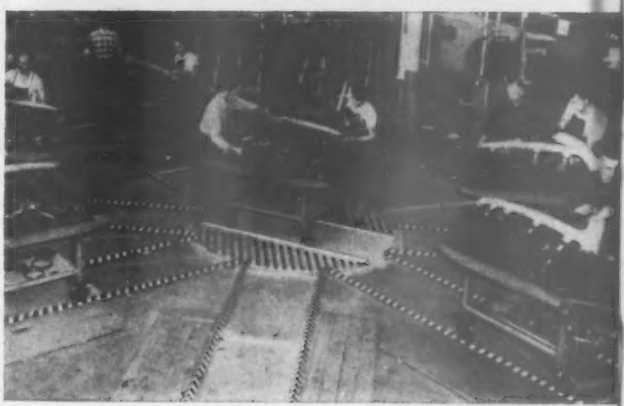
The conveyors have increased production 10%, saved labor, and improved housekeeping by cutting out manual handling of tote boxes.

"Roundhouse" Layout Saves Space

Ryan Aeronautical Co., San Diego, uses a locomotive roundhouse layout for a complicated positioning and spot-welding job.

A counterbalanced welding machine hung over a central turntable serves six assembly stations. The turntable can be swung so its rails meet stationary rails that radiate from the turntable to the assembly stations.

Exhaust headers are assembled on jigs mounted on flanged wheels. Assembly time varies from 10 to 30 minutes. When an assembly is ready, it is wheeled in the jig to the turntable for welding. Layout makes the job easier, saves about 40% in space.



How to get

Flexible Power in Your Lab

By GEORGE HANLON • Measurements Laboratory
Meter & Instrument Department
General Electric Company, West Lynn, Mass.

Does your plant have the required laboratory services for its testing needs? You're very fortunate if it has. Your scientists, engineers, and technicians need all sorts of electrical power sources. The time to provide them is when you build the laboratory buildings. But what facilities and how much of each will be required, and where in particular will they be needed? In most cases you don't know when you're planning the buildings.

General Electric Company solved a lot of these problems when it built the Measurement Laboratory at West Lynn. Here are some of the things G-E learned that will help you get the flexible power you need in your own laboratory.

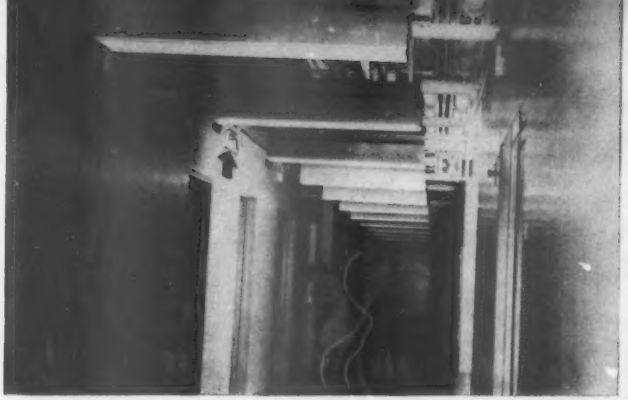
●

INSTALL WIREWAYS FUSED AT EACH OUTLET

Provide flexible electrical connections between rooms and floors by a tie-line system with plugboards on each floor. That means you can tie equipment in one room to another piece of equipment in another room on the same floor—or on another floor—without ever stringing any unsightly wiring. Here a special source of power is connected to a set of receptacles for a short-term test.

USE STANDARDIZED TESTING BENCHES

If your testing benches are all the same size you'll make it easy for yourself whenever you have to rearrange test equipment. Standardize your bench panels, too. Then you can interchange them without calling in a carpenter to do a complete remodeling job every time you want to set up for a different test.



PROVIDE WALL OPENINGS FOR UTILITIES

It's lots easier—and cheaper—to make ready for tomorrow's changes in electrical and mechanical services. The same framed opening that can be put in for $5 when the building is being erected may cost you $200 when the laboratory is in operation. And that doesn't include interruptions, delays, and possibly spoiled tests that will be blamed on—the maintenance department, of course.

You save time, trouble, and money, because your laboratory can't operate properly while electricians or pipefitters are kicking up a lot of dirt and noise—and they can hardly help it when they break through a wall. Dirt cannot be tolerated inside a laboratory. That's because delicate instruments and equipment under test must be free from contamination. In some cases even noise can wreck the delicate balance of a test.

Here distribution from the bus duct in the corridor to the various rooms is through framed openings (marked by arrows in photograph) at 10-ft. intervals along the corridor.

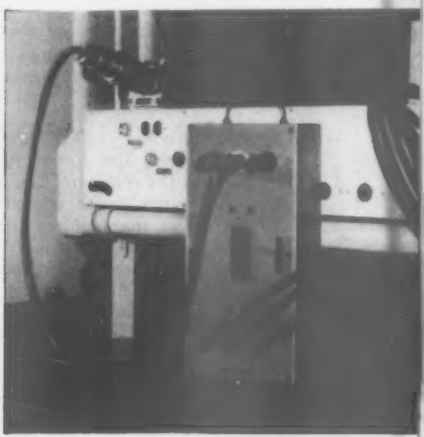
Above the conduit openings (not visible in photograph), larger framed openings make it possible to provide mechanical services to the floor above. And for built-in accessibility, main power, gas, water, and air piping runs along the ceiling of the corridors on each floor of the Measurements Laboratory.

Service can thus be removed or added without damaging the wall or disturbing the permanent distribution service lines in the corridor.

INSTALL WIREWAYS FUSED AT EACH OUTLET

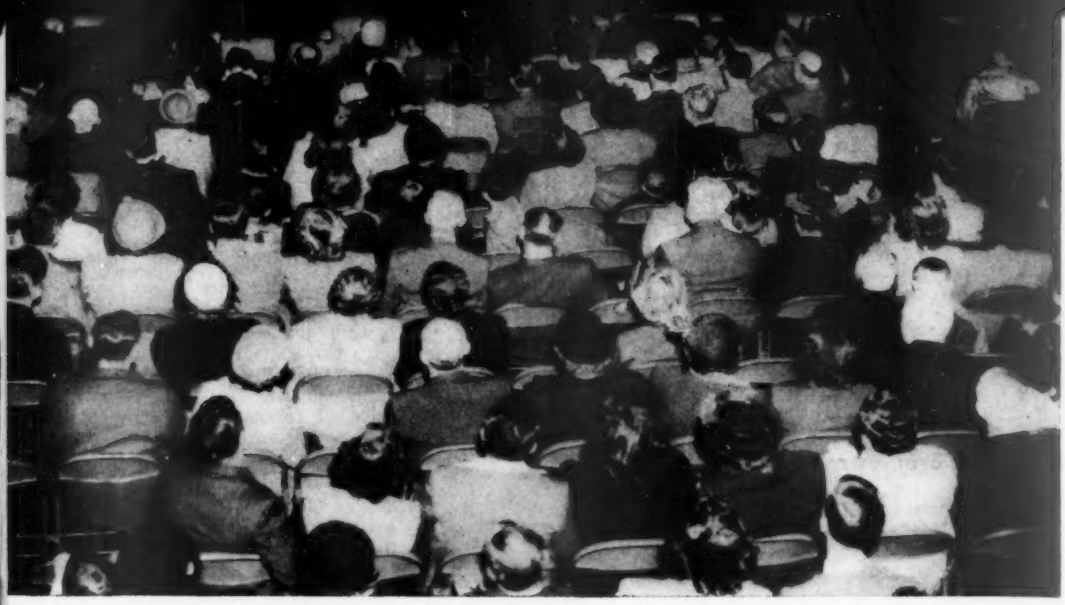
That saves you a lot of delays later on. Here wireways in each room that supply power to a number of devices to be tested have outlets for 20-amp. fuses. Any device tested can blow its own fuse without cutting out other units connected to the wireway. And anyone can replace a fuse.

Without this kind of set-up in a lab you're asking for trouble. You often test experimental equipment beyond safe load limits to determine safe operating ranges. That means overloads and possible short circuits to power supplies—and calling the electrician to restore service. That wastes both his and the technician's time.



USE PORTABLE CIRCUIT BREAKERS FOR BIG LOADS

For real flexibility on large power requirements, get yourself a portable circuit breaker. We had several 100-amp. breakers made up in portable boxes. Power for large loads can thus be controlled right in the test room. And, if trouble develops, you don't need to disturb anyone else.



To pack 'em in like this . . .

. . . A Movie Night That Tells

By JOHN BEMIS
Manager of Employee & Community Relations
Anaconda Wire & Cable Company, Hastings, N. Y

WE DIDN'T HAVE ANY LANA TURNER OR CARY GRANT in our brand-new film, *Nerves of the Nation*. The only star was the company. The film was in color, but that alone was hardly enough to put it across.

So there was the problem: How to present a 32-min. sales movie so it would prove to the men and women of Anaconda that there was a definite tie-in between the film and their jobs.

We wanted to show them that any money and effort spent to increase sales makes the best insurance of their own job security. And we wanted to be sure that the movie was well integrated into our industrial and community relations program.

Management mulled over the idea for several days. Finally it was agreed that there was only one way to do the job and do it right: *Stage a "World Premiere" at the Hastings plant, where much of the film had been taken.* And so we did.

HERE'S WHAT WE GOT

The show we developed packed 'em in. In a community of 7000 we had 5000 attending, mostly employees and relatives.

We earned extra dividends, too, since we got many requests from civic groups to repeat the entire program. We're still busy presenting it before high school groups and other associations.

We didn't stop there. We tried the same idea at our mill in Sycamore, Ill. In that community of 4500, more than 3000 attended. Then we hit two other mills—at Anderson, Ind., and Muskegon, Mich. Again it was "SRO" in both places.

Out of all this we accomplished several things:

1. We gave our employees a much broader picture of their company, and of the close relationship between sales and job security.

2. We stimulated our own management group to think and act with more enthusiasm in giving information about the company and its activities *first* to our own employees.

3. We feel we developed a healthy interest in the company on the part of our employees' families and friends in the community.

4. We made many good friends among local civic and professional leaders, and government officials.

HERE'S HOW WE DID IT

Committees · We wanted to get as much active participation as we could from employees. So we did the whole job with committees, on which as many as 98 employees worked in one mill.

First a steering committee was appointed to direct the over-all project. It included a mill manager, a member of the personnel department, public relations counsel Martin Wright, and myself.

1. **Work up a good program** — neither too short nor too long. If you can, be sure the films have a tie-in with the people and their jobs. Good idea might be to "trial run" your movie package to a representative preview audience; tally their reactions.

2. **Keep it on a "community" basis.** Try for your own little red schoolhouse, or similar symbolic public building. If this isn't possible, then settle for a movie house or the radio studios.

3. **Devise a master timetable.** Let it show what you should be doing four weeks before the event, on down to "deadline" — and even past it to the wind-up of your affair. And see that things are done on time.

4. **See that souvenirs tie into the daily lives of your audience.** Anaconda's most successful souvenir was a product give-away — a short length of television and FM antenna lead-in line.

5. **Have a photographer on hand** — more than one if the budget will stand it. Be sure they know their business (some don't). But be sure, too, you know which pictures will tell the story.

6. **Encourage employees to take over arrangements.** There is no substitute for their active participation. It helps them sell themselves on the event, and that helps sell it to others.

7. **Get your executives into the act.** Induce them all the way to the top to do more than put in a 5-second appearance. Have them on hand and doing a little bit of everything.

8. **Keep executive speeches short and pointed.** There should be a minimum of company back-slapping.

9. **For displays, hold down on static material.** Play up to the hilt your "in action" pieces — wheels turning, gears meshing, etc.

10. **Have an official "bookkeeper-historian."** His job is to see that a copy of every written item and picture connected with the event is put in a looseleaf binder as your official record. It can be used again and again as a guide for future events.

. . . follow these 10 rules for . . .

Your Company Story

The program · We were a long way from having a "movie night" with just one 32-min. film. We needed a full evening's entertainment.

Luckily we remembered that our parent company, Anaconda Copper Mining Company, had recently completed a film of its own, called *Copper*. Only a few people, mostly management, had seen it. We put in a hurry-up call for *Copper*, and got it. That brought the program up to one hour's running time.

But we felt that complete concentration on our company would be too much of a good thing. So the committee added a thrill-packed version of a recent winter Olympics and *Salt Water Wonderland*, an underwater close-up of deep sea life.

The place · But what about a home for our program? We felt we'd get more of a community flavor if we stayed away from movie houses, so we asked for the high school auditorium — and got it. In addition, the school superintendent asked us to stage a special matinee for school pupils, which we did.

The audience · We wanted the personal touch. So the mill manager wrote a personal letter to each employee (at home), issuing a friendly, informal invitation. Ticket request forms were enclosed.

Employees were asked to turn in ticket requests to their foremen or department heads, who got the tickets from personnel and gave them out *personally*. The requests poured in. In a few days we had to announce we were "sold out."

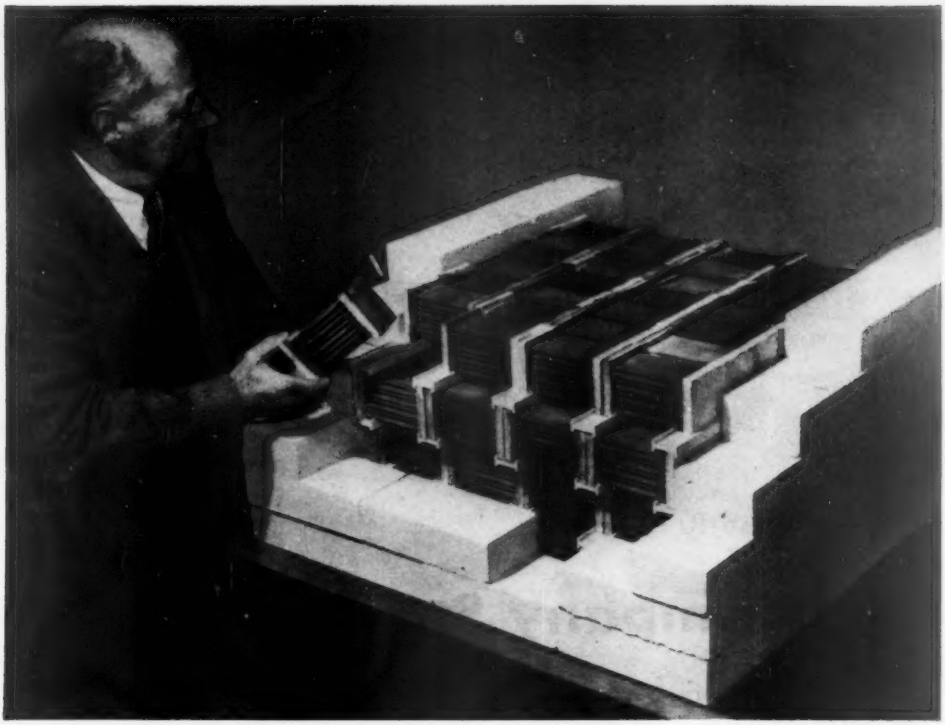
Promotion of exhibits · Once in action, employee committees really took over. They did a thorough job. Even the professional touches were there. For example, pointing the way to the auditorium were life-sized figures of "Little Conda," the Indian boy in Anaconda's advertising.

In addition, committees set up a series of demonstrations and displays in the lobby and rear of the auditorium. They showed how our products are made, and how they are used.

A girl operator ran a braiding machine that actually turned out braided cotton wire. A different girl "performed" each night. A television set pointed up the use of Anaconda's TV lead-in wire. And numerous displays of types of wire and cable filled out a well-balanced product story.

Special features · President H. Donn Keresey opened the first program with a short talk on the company's responsibility in the community. Other executives opened succeeding sessions. Each visitor also received a program and a piece of sales promotion literature, with a sample of the company's wire products. An attached note explained this was a sample of the kind of material used by the sales department to help sell the company's products.

Special groups were invited to each program: mayor and city council, Rotary, American Legion, and other groups, clergy, teachers, and the like. We didn't forget our pensioners. There was a special night for them.



NEW WEAPON AGAINST AIR POLLUTION is the catalytic brick being demonstrated by inventor Eugene Houdry. It removes odors by burning offensive gases in exhaust stacks. Table model shows bricks in a typical stack installation.

New Combustion Catalyst Beats

YOU MAY BE ABLE to solve your air pollution problems and make a tidy profit on the side. . . .

. . . if you are exhausting combustible hydrocarbon gases, vapors, or solids, and

. . . if you install a bank of Houdry catalysts.

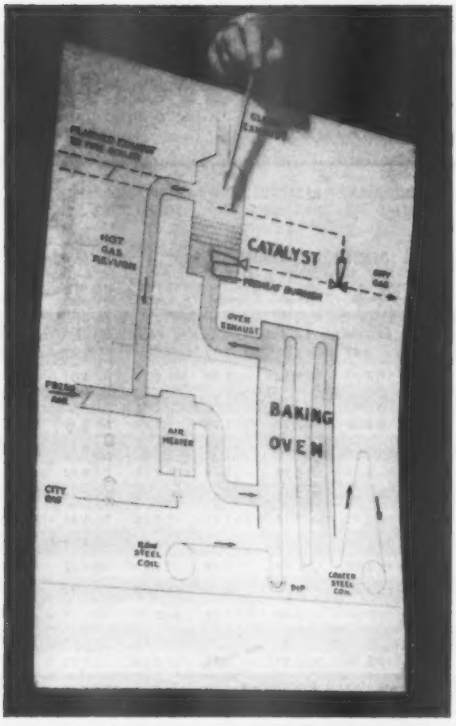
WHAT IT IS • The new combustion catalyst is the brain child of Eugene Houdry, inventor of the catalytic petroleum cracking process. The basic unit is a simple brick with 73 porcelain rods. Each rod has a coating of catalytic alumina and platinum alloy. This coating completely oxidizes combustibles even at temperatures well below their normal burning points. And generates enough waste heat to fire boilers and heat plant processes.

WHERE YOU USE IT • You can profitably oxidize any hydrocarbons with the new catalyst. It will burn industrial solvents, resins, organic dyes, varnishes and lacquers, oil fumes, smoke, and a host of other waste products that are pouring out of industrial stacks. It should pay its way, too, anywhere that unburned fuel is going up the flue.

The Oxy-Catalyst Manufacturing Company, Inc., Wayne, Pa., first marketed the catalyst as a muffler for industrial truck exhausts. In its debut in industry the catalyst licked a solvent odor problem for Enamelstrip Corporation, Allentown, Pa.

The next two installations will be at Crown Cork & Steel (to burn off solvent vapors) and at the Sun Oil Company (to burn catalyst dust escaping from an oil cracking process).

Catalytic installations still in the planning stage will tackle ink solvents, chemicals used in reclaiming rubber, and carbon black dust. Next will come the power plant field where the new catalyst may permit the burning of cheaper oils, keep furnaces cleaner, and make possible efficient combustion with close to zero percent excess air.



FIRST SUCCESS for catalyst was removal of paint solvent odors at Enamelstrip. Unit will also supply 90% of plant heat.

Air Pollution

HOW IT WORKS • To work, the catalyst must be raised to a temperature of 500 F. So in most cases you will have to use a pre-heat burner at start-up. But once oxidizing, the unit will sustain combustion of room temperature gases.

Stack temperature beyond the catalyst depends on the richness of the gases you are exhausting—but you can go as high as 1600 F. Actually, for every Btu/cfm. in your exhaust, the catalyst will raise stack temperature 55 F.

When oxidizing pure hydrocarbons, the catalyst should last indefinitely. In lab tests to date, the bricks have maintained peak efficiency after 5000 operating hours. But the catalyst is poisoned by metallic vapors. It can become clogged if there's a heavy flow of unburnable solids.

And now—how one plant is using this new catalytic method→

Odor's Gone, Heat's on at Plant Using Catalyst

By ARTHUR E. UHLEEN
Enamelstrip Corporation, Allentown, Pa.
Executive Vice President and General Manager

FOUR MONTHS AGO we spent $16,000 installing Houdry catalysts in our paint-drying ovens. We figured the money well spent if we could only get rid of a nasty air-pollution problem. Today our noxious fumes are gone. Our catalysts are generating enough heat to pay for themselves in six months. And they will in the near future cut our total plant fuel bill by 90%.

Here at Enamelstrip we pre-coat and pre-color continuous metal strip. In the process we drive off odorous solvent fumes. As production expanded, the fumes got thicker, and the local complaints came faster.

We tried several remedies—powders supposed to burn off the gases, water sprays that proved too bulky and costly for our scale of operations, and various catalysts. None really clicked till we tried the Houdry catalyst.

At present we have catalytic banks working in all four of our oven exhaust stacks. The results after four months show that we have:

- Licked the odor problem inside the plant and out. Health Department tests show only negligible traces of hydrocarbons in our stack.
- Pared our monthly plant fuel bill from $3000 to $750. Actually when we begin using catalyst heat to fire our boiler, we expect the bill to dwindle to 10% of what it was before.
- Increased oven production by 40%. With catalyst heat we can push our ovens beyond the previous capacity of our gas burners.

A typical installation is our No. 1 line. This oven dries up to 60 tons of strip a day at temperatures up to 550 F. It drives off about 20 gallons of solvent an hour, and exhausts the resulting gas-air mixture at a rate of 4000 cfm. To check odors here we put in a bank of 681 catalyst bricks.

Every Monday morning now we fire our No. 1 gas burner for 10 minutes to bring the oven up to temperature. We also turn on a pre-heat burner that raises the catalyst to its operating temperature of 500 F. The first solvent fumes, striking the hot catalyst, oxidize, and in so doing raise the stack temperature to as high as 1500 F. Then we turn off the burners, recirculate a portion of the hot exhaust, and the oven literally heats itself.

This catalyst unit has been operating at peak efficiency for three months without maintenance. Since we exhaust pure hydrocarbons, there are no contaminants to poison the catalysts, no unburnable solids to clog them. The stack draft loss of the catalysts is a low ⅛ inch H_2O.

What's Indirect Labor Worth?

● All figures are average straight-time earnings in manufacturing industries, except figures in light-face type, which are for *all* industries. They include incentive pay, if any. But they do *not* include overtime or night-shift premium.

Surveys were not all made at the same time. Date of each survey is shown under the city name.

		CLEVELAND OCT. 1951	DENVER NOV. 1951	DETROIT DEC. 1951	HARTFORD OCT. 1951	HOUSTON JAN. 1952	INDIANAPOLIS DEC. 1951	KANSAS CITY, MO. NOV. 1951
MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN		AVERAGE STRAIGHT-TIME HOURLY EARNINGS						
Maintenance and Power Plant Jobs	Carpenters, maintenance	$ 1.93	$ 1.67	$ 2.07	$ 1.79	$ 2.14	$ 1.88	$ 1.86
	Electricians, maintenance	1.96	1.75	2.16	1.80	2.13	1.95	1.92
	Engineers, stationary	1.98	1.72	2.18	1.87	1.83	1.87	1.99
	Firemen, stationary boiler	1.70	1.56	1.86	1.39	1.71	1.48	1.62
	Helpers, trades	1.67	1.43	1.68	1.43	1.84	1.49	1.58
	Machinists, maintenance	1.97	1.78	2.18	1.79	2.15	2.03	1.92
	Mechanics, automotive (maintenance)	1.87	1.64	2.02	1.62	1.88	1.83	1.91
	Mechanics, maintenance	1.96	1.73	2.16	1.83	1.98	1.83	1.83
	Millwrights	1.89	1.78	2.10	1.68	2.01	1.95	2.00
	Oilers	1.62	1.47	1.79	1.40	1.57	1.53	1.49
	Painters, maintenance	1.89	1.60	2.01	1.61	2.07	1.82	1.89
	Pipe fitters, maintenance	1.97	—	2.09	1.63	2.23	1.94	2.01
	Sheetmetal workers, maintenance	1.96	1.85	2.12	—	2.34	1.96	1.86
	Tool and die makers (other than job shops)	2.13	1.94	2.31	1.96	2.10	2.13	2.09
Custodial, Warehousing, and Shipping Jobs	Crane operators, electric bridge (under 20 tons)	$ 1.95	$ 1.42	$ 1.87	$ 1.52	$ 1.57	$ 1.63	$ 1.47
	Guards	1.58	1.38	1.77	1.43	1.66	1.51	1.55
	Janitors, porters, and cleaners	1.39	1.22	1.60	1.24	1.17	1.29	1.28
	Janitors, porters, and cleaners (female)	1.20	1.02	1.52	1.22	.98	1.30	1.11
	Order fillers	1.63	1.38	1.71	1.32	1.41	1.34	1.25
	Packers	1.61	1.28	1.75	1.34	1.60	1.35	1.43
	Packers (female)	1.19	—	1.44	1.18	—	1.20	.97
	Shipping clerks	1.64	1.55	1.84	1.52	1.63	1.58	1.45
	Shipping and receiving clerks	1.71	1.41	1.82	1.35	1.54	1.55	1.41
	Stock handlers and truckers, hand	1.55	1.27	1.70	1.24	1.20	1.33	1.43
	Truck drivers, light (under 1½ tons)	1.62	1.31	1.77	1.23	1.34	1.64	1.42
	Truck drivers, medium (1½ to 4 tons)	1.64	1.41	1.95	1.38	1.42	1.46	1.49
	Truckers, power (fork lift)	1.65	1.30	1.75	1.40	1.44	1.52	1.61
	Truckers, power (other than fork lift)	1.65	1.43	1.80	1.36	1.35	1.61	1.54
	Watchmen	1.25	1.04	1.66	1.22	.98	1.16	1.26
FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN		AVERAGE STRAIGHT-TIME WEEKLY EARNINGS						
Office, Professional, and Technical Jobs	Comptometer operators	$53.50	$49.00	$59.00	$49.50	$53.00	$51.00	$49.00
	Draftsmen (male)	82.50	86.50	101.50	79.00	81.00	86.50	73.50
	Draftsmen, junior (male)	64.00	68.00	75.50	60.50	56.00	66.00	60.00
	Duplicating-machine operators	45.00	45.00	47.50	39.00	39.50	46.00	41.50
	Key-punch operators	51.00	51.00	55.50	42.00	56.50	50.50	46.00
	Nurses (registered)	61.00	62.50	69.00	61.00	67.00	61.50	58.50
	Office girls	39.00	43.50	43.00	39.50	38.00	42.50	36.50
	Payroll clerks	54.00	48.50	61.00	49.50	55.50	53.50	48.00
	Secretaries	63.50	60.00	71.00	61.50	64.50	64.00	58.50
	Stenographers, general	54.50	52.00	60.50	49.50	55.00	53.50	52.00
	Typists, class A	51.50	44.50	57.50	50.00	52.50	50.50	48.00
	Typists, class B	43.00	42.50	47.50	44.50	46.00	42.50	39.50

Here's a real yardstick for judging your wage structure for key indirect labor jobs. It's the result of surveys in 20 major cities by the Bureau of Labor Statistics, U. S. Labor Dept.

As forecast by FACTORY (December, 1951, p. 108), this is the first time these figures have ever been made available. Another 20-city report will appear in FACTORY soon.

Want more details? Write your nearest BLS Regional Office.

MEMPHIS NOV. 1951	MINNEAPOLIS-ST. PAUL NOV. 1951	NEWARK-JERSEY CITY NOV. 1951	NEW ORLEANS DEC. 1951	OKLAHOMA CITY OCT. 1951	PHILADELPHIA OCT. 1951	PITTSBURGH NOV. 1951	PROVIDENCE DEC. 1951	RICHMOND OCT. 1951	SALT LAKE CITY DEC. 1951	SAN FRANCISCO-OAKLAND JAN. 1952	SEATTLE SEPT. 1951	WORCESTER JAN. 1952
$ 1.44	$ 1.79	$ 2.06	$ 1.50	$ 1.63	$ 1.87	$ 1.89	$ 1.65	$ 1.64	$ 1.82	$ 2.12	$ 1.97	$ 1.67
1.90	1.96	2.06	1.66	1.66	1.94	1.99	1.65	1.88	1.88	2.15	1.99	1.79
1.81	1.84	2.22	1.77	1.69	1.73	1.91	1.78	1.56	–	2.12	1.99	1.75
1.13	1.64	1.71	1.18	1.48	1.52	1.63	1.40	1.15	1.74	1.91	1.74	1.49
1.10	1.56	1.68	1.29	–	1.57	1.59	1.38	1.51	1.51	1.71	1.59	1.51
1.80	1.94	2.00	–	1.76	2.03	2.01	1.65	1.88	1.84	2.13	2.03	1.85
1.32	1.83	1.88	1.42	1.44	1.67	1.96	1.54	1.86	1.65	2.16	2.04	1.53
1.54	1.85	1.93	1.58	–	1.82	1.86	1.66	1.86	1.64	2.02	1.97	1.76
1.93	1.87	2.09	1.65	1.63	1.85	1.96	1.66	–	–	2.08	2.05	1.77
1.48	1.56	1.60	1.29	1.47	1.46	1.56	1.35	1.37	1.36	1.70	1.76	1.47
1.61	1.83	1.91	1.53	1.46	1.82	1.79	1.49	1.87	1.65	2.11	1.98	1.61
–	2.02	2.16	1.52	–	1.96	1.84	1.65	–	1.93	2.16	2.00	1.77
1.95	1.83	2.08	–	–	1.85	1.99	1.72	–	–	2.11	2.11	–
–	2.13	2.13	–	1.74	2.06	2.08	1.79	–	–	2.37	2.26	1.82
$ 1.38	$ 1.52	$ 1.54	$ 1.26	$ 1.46	$ 1.56	$ 1.72	$ 1.41	–	$ 1.61	$ 1.77	$ 1.80	$ 1.46
1.49	1.44	1.55	1.13	1.26	1.42	1.61	1.22	1.54	–	1.65	1.44	1.45
1.01	1.34	1.36	.98	1.08	1.23	1.34	1.16	1.09	1.23	1.52	1.42	1.24
.81	1.14	1.24	.52	.87	1.07	1.15	1.05	1.00	.81	1.44	1.14	1.21
1.14	1.40	1.48	1.02	1.25	1.32	1.62	1.21	1.13	1.25	1.61	1.51	1.18
1.01	1.39	1.49	1.11	1.15	1.35	1.54	1.20	1.10	1.29	1.58	1.63	1.45
–	1.14	1.26	.92	–	1.17	–	.95	1.05	1.08	1.29	1.31	1.05
1.41	1.53	1.59	1.33	1.22	1.51	1.60	1.47	1.48	1.28	1.78	1.75	1.41
1.23	1.54	1.65	1.28	1.28	1.58	1.57	1.27	1.32	1.42	1.90	1.86	1.38
1.04	1.42	1.43	1.07	1.19	1.33	1.51	1.28	1.11	1.33	1.65	1.67	1.31
1.00	1.62	1.74	.88	1.04	1.49	1.76	1.26	.94	1.26	1.96	1.84	1.44
1.02	1.65	1.84	1.00	1.26	1.57	1.83	1.34	1.06	1.35	2.03	1.89	1.30
1.50	1.51	1.60	1.27	1.36	1.45	1.63	1.35	1.19	1.40	1.73	1.65	1.43
1.35	1.41	1.55	–	–	1.39	1.70	1.32	–	1.35	1.65	1.85	1.53
.95	1.38	1.25	.88	1.16	1.24	1.33	1.21	1.04	1.33	1.52	1.64	1.26
$51.00	$47.00	$52.00	$50.00	$47.00	$47.00	$48.00	$44.50	$47.50	$48.00	$58.00	$52.50	$44.50
68.00	69.50	83.00	75.50	77.00	82.00	91.00	73.50	82.00	72.50	86.00	84.00	73.50
60.00	53.50	60.50	–	63.00	59.00	72.00	58.00	48.00	65.00	70.00	71.00	58.50
44.50	40.00	46.00	38.00	45.00	41.50	42.00	39.00	38.00	36.00	52.50	48.50	41.00
46.50	44.50	48.50	43.00	45.00	46.00	47.50	40.00	49.00	40.50	55.00	55.50	44.50
57.00	60.50	64.50	52.50	55.00	60.50	63.00	56.00	60.50	–	64.00	–	57.00
35.00	35.00	37.50	30.50	37.50	34.50	41.00	35.00	34.50	34.50	46.50	45.50	39.00
50.00	48.00	52.00	49.50	54.50	47.00	52.00	45.00	49.00	51.00	57.50	59.50	45.50
60.00	56.50	63.50	57.00	54.50	62.50	62.00	52.00	61.00	59.00	68.50	67.50	58.00
47.00	46.00	51.50	49.50	48.50	49.50	52.00	44.00	48.50	47.50	60.50	55.50	46.50
46.50	46.50	49.00	44.50	43.50	45.50	51.00	44.00	49.00	43.00	56.00	54.00	50.50
39.00	39.50	44.50	40.00	36.50	40.00	41.50	39.00	39.00	36.00	52.00	49.00	40.50

TIPS TO GOOD HUMAN RELATIONS for factory executives

By M. J. MURPHY • Industrial Relations Editor

TV MENACES RECREATION PROGRAMS School authorities aren't the only ones worried about the impact of TV. Another kind of "homework"—industrial recreation—has begun to feel the opposing pull of television programs. At least, that's the report of industry people who attended the recent convention of the National Industrial Recreation Assn.

The convention doesn't offer specific solutions to the problem for plants that are considering recreation programs or now have them. But the implication is that you ought to think twice about setting up recreation activities that conflict with popular TV program hours.

Despite the TV menace, though, industrial recreation is going great guns, the association reports. Estimates are that 6000 companies, employing around 30-million workers, now have some kind of recreation activity going.

INCENTIVES FOR SOCIETIES Ever have trouble maintaining interest in local chapter activities of national professional societies you belong to? If so, it may be worth your while to look into the incentive plan used by the National Association of Cost Accountants. Headquarters office is in New York. Address: 505 Park Ave., New York, N. Y.

The system has direct money incentive tied in with an excellent competitive program that maintains interest and also makes constructive contributions to the membership.

"QUOTABLE QUOTE" Here's our nomination for the quote of the year —from Gustav Metzman, president, New York Central System:

"Most businessmen generally are so busy coping with immediate and piecemeal matters that there is a lamentable tendency to let the 'long run' or future take care of itself. . . .

"As a prominent educator has expressed it, Americans generally spend so much time on things that are urgent that we have none left to spend on those that are important."

ONE WAY TO USE OLDER WORKERS Here's something to think about—a possible future development as our over-65 population continues to grow. The

Titan Machine Co., Denmark, not long ago opened up a plant that employs only over-65 workers. They work a 4-hour day. Report is that the company has been swamped with applications.

WHAT'S GOOD PUBLIC RELATIONS WORTH? How far do you go to preserve good public relations? The answer is, "plenty far," in Borg-Warner Corp.'s book. Far enough to spend $200,000 for equipment that isn't needed for the process in just one project. That's what has happened in this company's Ingersoll Products Division, where they've nearly finished a new building to house two steel melting furnaces.

The extra $200,000 was spent to eliminate power-system interference with TV, radio, and other electrical service to homeowners in the area around the Chicago plant. Another $85,000 has gone to eliminating fumes and smoke via an electrostatic type of dust collector. A fine example of letting actions speak louder than words.

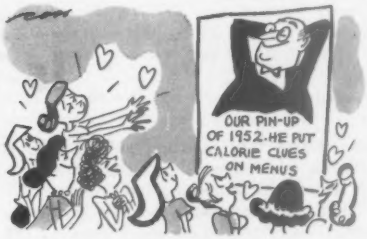
WHY HAVE A SUGGESTION SYSTEM? Here's the best reason we've ever heard for having a suggestion system — in the words of M. R. Liles, of Detroit:

"We're constantly pushing and pulling to get men to skin their eye-balls back—to see the real implications of new ideas. A man with an idea is sure to be frustrated if he hasn't got anyone to listen to him."

HOW TO SET UP PLANT FOOD SERVICE Thinking of setting up a new food service facility for workers — or improving what you have? If so, you'll certainly want a copy of a fine handbook on the subject just put out by Hotpoint, Inc. It covers the waterfront, includes much helpful detail on space requirements, layout, and equipment, as well as policies, types of service, and responsibilities of food service personnel. It's written by C. W. Schroeder, Hotpoint's chief food-service engineer.

Want a copy? Write to Commercial Equipment Dept., Hotpoint, Inc., 227 S. Seeley Ave., Chicago 12. No charge.

HOW TO RUN AN OPEN HOUSE If you want to see the booklet of the year on how to run an open house—and why—then write for a copy to The Steel Improvement & Forge Co., 970 E. 64 St., Cleveland, 3. Here's how editor Bob Dilley described it when he sent it on from Cleveland: "It's one of the sweetest jobs I've ever seen from the standpoint of holding your interest, continuity, and telling a story well."

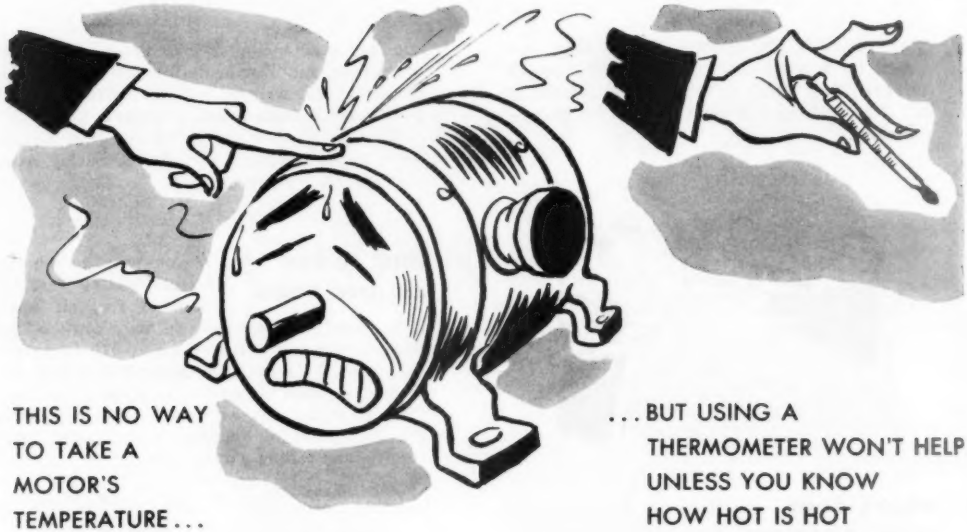


ACCENT ON DIET If you have very many women employees in your plant, here's an idea they'll go for: Just put down on your cafeteria menus the number of calories in the various dishes you serve. A big insurance company that's been doing it reports the gals consider the fellow who thought up this one their pin-up guy of the year.

MAKE REPORTS EASY TO ANALYZE Ever think of typing names of female employees in red, males in black, when you make up lists of employees for various purposes?

Works fine wherever sex differences are important—as in attendance and illness records and safety reports. U. K. Time branch of United States Times Corp. uses the system with the monthly attendance reports it regularly supplies to supervisors. Company finds it helpful.

The system also supplies one answer to the old question of what to do with the red half of typewriter ribbons.



THIS IS NO WAY TO TAKE A MOTOR'S TEMPERATURE . . .

. . . BUT USING A THERMOMETER WON'T HELP UNLESS YOU KNOW HOW HOT IS HOT

Is That Motor REALLY

MANY TIMES that question gets bucked clear up to the plant manager. Yes, the plant manager himself. It happens something like this:

"That motor's running too hot—got to see what's wrong," says the plant electrician to the maintenance superintendent.

Says the maintenance superintendent to the production manager: "We've got to shut down this machine before the motor burns up. She's too hot."

"Are you crazy?" the production manager shouts. "We can't afford to shut down this machine for even a minute. Production is way behind, and besides you're *always* hollering that motors are running hot. We never lost a motor before when you claimed 'too hot.' "

"Sure, it may last a week," the maintenance super answers. "But you're cutting plenty of life off the motor. My budget is full of holes from buying new motors or rewinding burned-out motors that were running too hot. I say you're asking for trouble if you don't shut down this machine. Let's see what the Old Man decides to do about it."

Then the Old Man, Mr. Plant Manager himself, always asks the same question: "Is the motor really too hot, and how can you tell?"

The answer is not simple. In the first place, it really raises five questions:

1. What is the internal temperature of the motor windings?
2. What is the ambient temperature in which the motor is operating?
3. How are you measuring temperature?
4. What is the type of motor enclosure?
5. What type of insulation is on the winding?

We took these questions to a motor expert. This article is his answer. You don't have to be an electrical engineer to understand it.

DEFINITIONS

CLASS "A" MOTORS • Most of your motors are probably in this group. They're designed to operate in most normal conditions. The windings of this class of motor are covered with cotton, silk, paper, and similiar material. Varnishes (enamels) with no other coverings on the wire are used in newer-type motors.

CLASS "B" MOTORS • These are designed for higher operating temperatures or other abnormal conditions. The motor windings are covered with mica, asbestos, fibrous glass, and similiar inorganic materials. A small portion of class "A" material may be used for structural purposes only.

CLASS "H" MOTORS • These can withstand extreme conditions of heat and humidity. Windings are of the same type of material as in class "B" motors. However, the binding material is composed of silicone compounds.

Too Hot?

By R. F. WOLL • Motor Engineering Department
Westinghouse Electric Corporation, Buffalo

TO KNOW WHETHER a motor is running too hot, you must know the temperature of the internal windings at their hottest spot. That's where the insulation gets its roughest treatment from heat—and that's where it will be destroyed first.

But, as a practical matter, you can't get at that spot. So you have to use other facts about temperature to figure out how hot the internal windings really are. Once you know, you can compare the temperature of your motor's internal windings with the "maximum allowable temperature" for such a motor. Here are the "maximum allowables" for the three main classes of insulation:

Class A	105 C.
Class B	130 C.
Class H	180 C.

These figures are the result of considerable study and afford a satisfactory life expectancy of approximately seven years for the insulation. Operate your motors at lower temperatures and you can expect longer life out of your motor insulation. On the other hand, exceed these temperatures and you will get appreciably shorter life.

In support of this statement, the familiar "10-degree rule" has long been used by operating men. For every 10 C. rise above the ratings listed above, you are cutting the life of your motor insulation in half. Once the insulation is destroyed, you can expect grounds and short circuits to blow fuses—and, in some cases, the motor will catch fire and burn up. In either case, a rewind will usually be necessary.

HOW TO FIND THE INTERNAL WINDING TEMPERATURE

The temperature in the heart of the motor is the sum of three figures:

1 • **Ambient temperature** — which is the temperature of the air immediately surrounding the motor.

2 • **Temperature rise** — which is the number of degrees that the hottest part of the winding accessible for thermometer measurement rises above the ambient temperature. This is the temperature rating that is generally stamped on the motor nameplate.

3 • **Hot-spot allowance** — which is the difference that can be expected between the hottest *inaccessible* part of the motor winding and the hottest *accessible* spot. (Of course, the inaccessible spot of the winding will be the hotter of the two.)

Now let's see how we can get and apply this information.

First, to get the ambient temperature, make sure you measure the temperature of the air that is actually ventilating the motor. Hang a thermometer (Centigrade scale) near the motor and in the incoming stream of air that flows through the motor (or around an enclosed motor). Don't depend on a thermometer that is hanging on the wall across the room. The motor only cares about the air that it is using to ventilate itself.

Next, use a second thermometer (both temperatures will have to be taken at the same time) to measure the accessible part of the motor windings. Better yet, use several thermometers, placing them at various places on the windings and cores to get an indication of as much of the windings as possible.

To make sure of reliable readings of the winding temperatures, it is necessary to protect the bulb of the thermometer from the cooling air supply by enclosing it in a wad of putty. You can also get the same protection by placing the bulb in a pocket made by a patch of felt cemented to the winding area to be measured.

(If you can't attach thermometers to the windings, you may be able to insert thermocouples. This method has the disadvantage that rather delicate and expensive instruments are required to read the voltages generated by the thermocouples. Still another method is by measuring resistance, which we will discuss later.)

Assume now that you have the temperature of the accessible windings. Subtract the ambient temperature from the winding temperature. This will give you the temperature rise.

You're ready for the next step. Add the hot-spot

allowance to the ambient temperature and temperature rise. The proper hot-spot allowance has been carefully determined by the motor manufacturer by tests. At right are the hot-spot allowances for the various types of motors. (These ratings are to be used when motor temperatures are taken by thermometer.)

Adding the three temperature figures that you now have, you get the internal operating temperature of your motor. Is it too hot? You can quickly tell by matching it against these figures: Class A — 105 C.; Class B — 130 C.; Class H — 180 C.

HOT-SPOT ALLOWANCE

Class "A"

Open, drip-proof, splash proof.....15 C.
Totally enclosed.....10 C.

Class "B"

Open, same as above.....20 C.
Totally enclosed.....15 C.

Class "H"

Open, same as above.....30 C.
Totally enclosed (fan-cooled).....25 C.
Totally enclosed (non-vent).....25 C.

CLASS OF MOTOR	ENCLOSURE	AMBIENT	TEMPERATURE RISE	HOT-SPOT ALLOWANCE	MAXIMUM INTERNAL TEMP.
A	Open	40 C.	50 C.	15 C.	105 C.
	Totally enclosed	40 C.	55 C.	10 C.	105 C.
B	Open	40 C.	70 C.	20 C.	130 C.
	Totally enclosed	40 C.	75 C.	15 C.	130 C.
H	Open	40 C.	110 C.	30 C.	180 C.
	Totally enclosed (fan-cooled)	40 C.	115 C.	25 C.	180 C.
	Totally enclosed (non-vent)	40 C.	120 C.	20 C.	180 C.

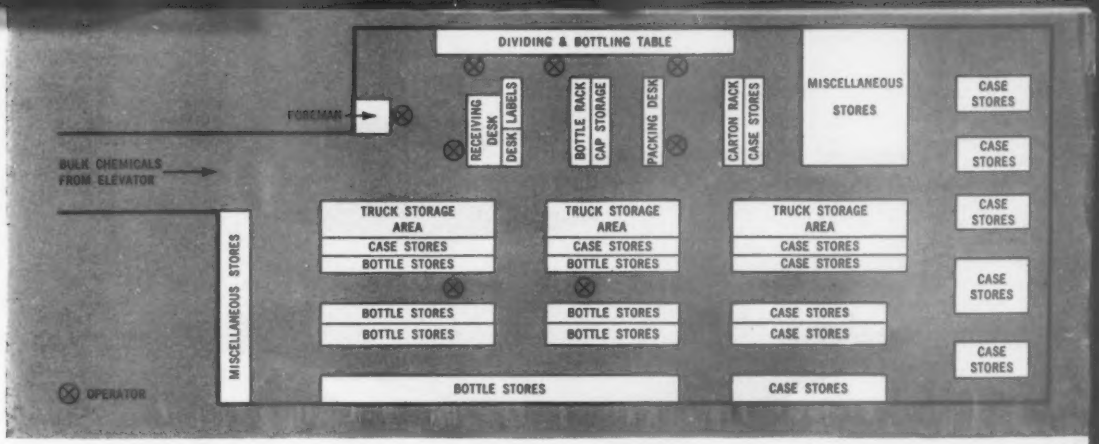
THE PROPER BALANCE OF TEMPERATURES

But this doesn't always mean that you're perfectly safe. You should study the balance between your ambient temperature reading and your temperature rise. The manufacturer stamps a rating of temperature rise on the nameplate that has been based on an ambient temperature of 40 C.

If your ambient temperature is above 40 C. (104 F.) and your temperature rise is as high as the nameplate rating, you are already in trouble. On the other hand, if your ambient is below 40 C. you might feel that you can operate your motor at a higher load, which will give you a higher temperature rise than nameplate rating. *BUT BEWARE!* Ambient temperatures have a bad habit of not being consistent. Unless you're operating in an air conditioned area you will find your ambient temperatures will vary with the weather and load conditions in your plant.

The table above is a guide to all temperatures. All the ratings are based on temperatures taken by means of thermometers. Because of the recent trend to enclosures affording greater protection to the motor interior, it is frequently quite inconvenient to install thermometers on the windings of even the open motor. This has led to an increased use of an alternative method of measuring temperature rise, namely rise by resistance.

This is simply a means of calculating the temperature rise in the winding of an induction motor by comparing its resistance before and at the end of a suitably long period of operating at rated load. The relations among ambient temperature, temperature rise, hot-spot allowance, and internal operating temperature are similar in nature to those explained when discussing rise by thermometer. However, since the rise by resistance is a measure of the average temperature of the entire winding it gives a temperature rise more closely approximating the hot-spot temperature than does the thermometer measurement. Consequently, the allowable temperature rise by resistance is slightly higher, and the hot-spot allowance correspondingly lower.



EIGHT MEN CAN NOW DO MORE picking and packing than the eleven men who used to man Central Scientific Company's chemical warehouse—mainly because it has been laid out for less walking, less handling, more productive effort.

Common-sense layout ...

Speeds Order Picking

By **LESLIE A. SEVERSEN** • Manager of Warehousing Division
Central Scientific Company, Chicago

IN OUR CHEMICAL WAREHOUSE we recently completed improvements that:

1. Enable us to handle a 15% greater load.
2. Cut warehouse personnel from 11 to 8.
3. Cut the time necessary to fill orders by 80%.
4. Cut the time necessary to take inventory 80%.

Good results, I think you'll agree. But here's the best part: We got these results simply by applying common-sense fundamentals of layout and storage. The cost of revision will be paid off in eight months by the savings in labor cost alone.

Our problem is to package and store 6000 different combinations of chemicals and containers. Not too unlike the problems of tool storage, small parts storage, or, for that matter, general stores or warehousing in any small plant. Here's what we did:

1. We relaid out our warehouse to cut handling and walking to the minimum. Bulk chemicals are delivered by the elevator at the left. They're taken to the receiving desk where quantities are checked against the invoice. As they're checked, they are placed on the bottling and dividing table, just across the aisle.

On that table the bulk material is weighed into bottles of the correct size. Bottles are capped and labeled. And some of the bottles are put into cartons. The others are left loose to fill small orders.

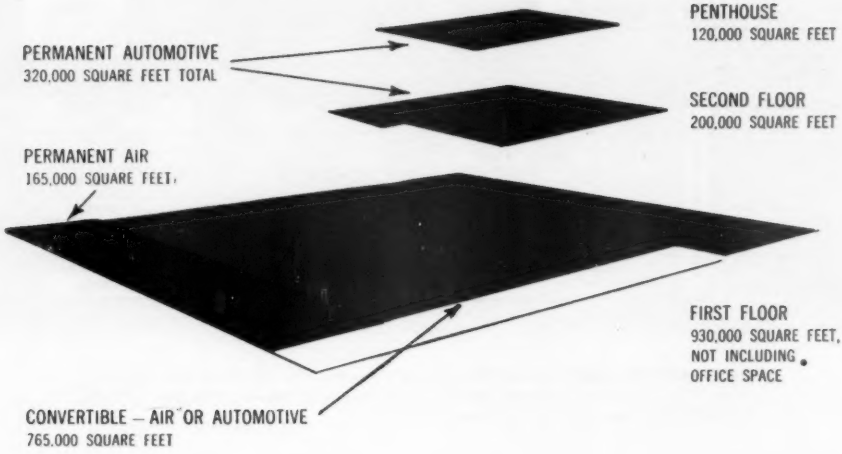
Bottles, caps, labels, and cartons are located in racks directly behind the operators. Walking is minimized.

There are no dead-end aisles. In our old layout, the racks were turned 90 degrees from their present position and extended in rows from both walls to one center aisle. It meant that the stockman had to enter an aisle, select what he needed, retrace his steps to the center aisle, enter the next aisle, and so on. The new layout saves a lot of steps—and time.

2. We reorganized the placement of products on the shelves. Note that there are storage racks for case lots and storage racks for bottles. We made a study of past orders, found out how many orders call for just one or two bottles of a chemical, how many for case lots. And we divide our stock accordingly. When a customer orders 40 5-lb. bottles now, we just put his address on 10 cartons (which are ready for shipment when they're put into stores), and ship. Formerly we had to pick 40 bottles off the shelf, pack them in a carton, seal it, address it, and ship it. Makes a big difference when we want to get an order out in a hurry. And saves inventory-taking time; it's easier to count cartons than individual bottles.

In the bottle racks there are separate sections for ¼-lb., 1-lb., and 5-lb. bottles. Within these sections, chemicals are arranged in alphabetical order.

Within a few days after the relayout was complete, our stockmen knew the location of any chemical in any bottle size. And without conscious thought they were able to pick their orders in an organized, step-saving way. On the front of the shelf under each chemical is a card giving the bin location of cases of that chemical in that size, for easy reference in case the "cupboard is bare."



DISTRIBUTION OF SPACE is shown in this schematic of the three plant levels. When operations start in mid-1953, present schedules call for 200,000 square feet of the "convertible" area to be used for airplanes, 565,000 square feet for automobiles.

For Fast Conversion

By CARROLL W. BOYCE
National Affairs Editor

The first plant ever deliberately planned as a dual-purpose plant is now being built by General Motors Corporation at Arlington, Tex. It is scheduled to start production in mid-1953.

Dual-purpose plants have been talked about for a long time. The idea got a big shove forward in October 1951, when GM's president C. E. Wilson made a specific proposal to American manufacturers—and at the same time hinted that GM was ready to proceed on its own initiative.

Now the plant is becoming a reality.

WHAT ARE ITS "DUAL" PURPOSES?

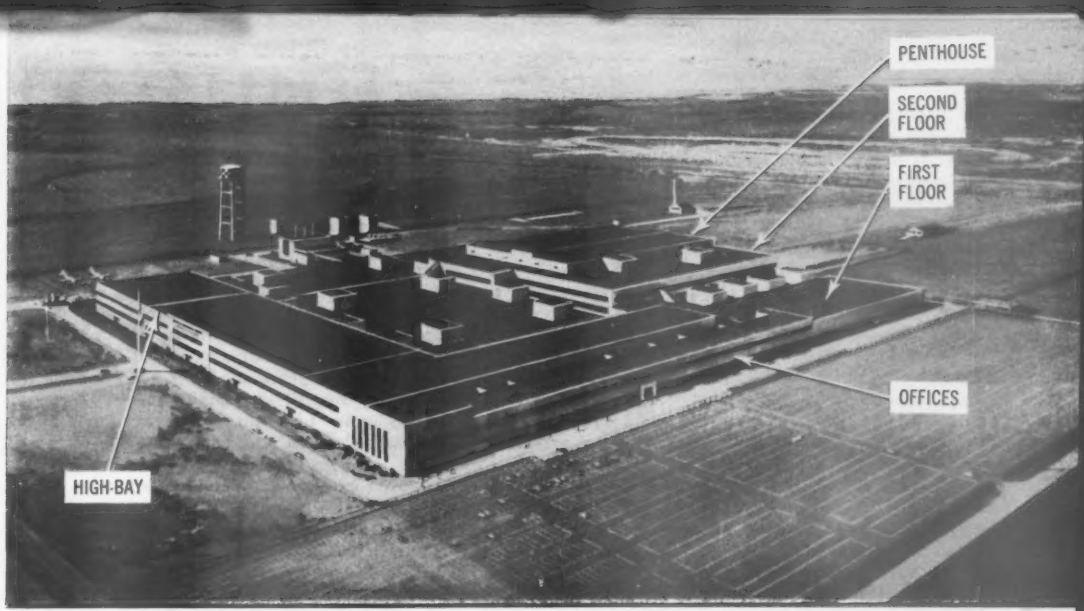
It would be more accurate to say that the Arlington plant will be a triple-purpose facility. It can be used (1) for total war production, (2) for total civilian production, or (3) for combined war-civilian production.

If you have enough time and money available to make the necessary changes, that's largely true of most "heavy" manufacturing plants. The thing that distinguishes the dual-purpose plant is its ability to shift rapidly from one type of production to another. The tools and machines needed for war or civilian production are right in the plant—either in use or in storage, depending on the needs of the moment.

The Arlington plant will assemble Buick, Oldsmobile, and Pontiac cars. *And* it will assemble a Grumman-design airplane. That is, it is *now* scheduled for combined production when it starts operating in mid-1953.

HOW FAST CAN IT CONVERT?

GM officials figure it will be possible to shift from combined production to all-out production of planes in a matter of days—probably in less time that it would take materials for the new program to arrive.



EXTRA STORIES AND HIGH BAY of this Arlington, Tex., plant are deviations from General Motors "standard" Buick-Olds-Pontiac assembly buildings. But they'll make it possible to convert to plane work in less time than it takes to get materials.

the Dual-Purpose Plant

WHAT ARE ITS ADVANTAGES?

Really, its *only* advantage is the ability to shift rapidly from one type of production to another. But that advantage is translated into two definite benefits—one for the company, one for the nation in time of emergency.

1. The company gets the benefit of added stability in its labor force. It is easier to get—and hold—good workers when they know their jobs are secure against long lay-offs during conversions or reconversions. The company also avoids the cost of hiring and training replacements for those who leave permanently during such lay-offs.

And, as many of the present "war baby" plants can testify, it's tough to recruit workers if they think there's a chance the plant will shut down completely when war production slacks off—as a lot of plants did at the end of World War II.

2. The nation gets the benefit of increased security at reasonable cost. If the need for all-out war production ever comes, the greatest premium will be on time. Military authorities estimate we have to have tremendous war-production potentials "in being."

You can get these potentials in single-purpose, war-production plants. We are now finding out (FACTORY, June 1952, page W-4) that it is inefficient and expensive to maintain such plants in non-productive readiness, or to operate them at low-production levels (substantially below the breakeven point).

The dual-purpose plant is the second way to get the needed potentials. Over-all efficiency of the plant is not quite so great (for any type of production) as a single-purpose plant operating at capacity. But you don't have the cost of maintaining complete non-productive plants on standby—and you have a full, trained labor force assembled.

WHAT IS IT LIKE — PHYSICALLY?

The manufacturing area of any dual-purpose plant is made up of three clearly defined areas—one permanently assigned to war production; another permanently assigned to civilian production; and a third that can be used for either purpose.

Here's how that will work at Arlington:

Total area of the all-air conditioned plant will be 1,250,000 square feet—930,000 on the main floor and 320,000 in a second floor and penthouse.

The second floor and penthouse are permanent automotive areas. Here are such things as bonderizing tanks, spray booths, ovens, and other facilities that could not ordinarily be moved without complete destruction. In addition, there is enough free space here to store all the first-floor equipment normally used in auto assembly.

At one end of the main floor is a high (35-ft.)

bay, 200x810 feet. This is the permanent aircraft area. It is big enough for a pilot-line operation, plus storage of the facilities needed for expansion to all-out aircraft production.

The remaining 765,000 square feet on the main floor is the "dual-purpose" area: It can be used for aircraft, automobiles, or a combination.

As the starting schedules are now envisioned, aircraft will get about 200,000 and automobiles about 565,000 of this 765,000 square feet. This will make possible assembly of 20 Buick, Olds, and Pontiac cars in the total 885,000 square feet to be used for automotive purposes.

GM has had to make one major change in its normal manufacturing set-up to provide for possible switch-over to aircraft: Conveyors in the automotive sections will all be in channel pits in the floor. Above-floor conveyorizing is out. That means that, when automotive space is needed for aircraft, a smooth base will be immediately available for other processes and equipment.

Of course, other changes in GM's "standard" assembly plant plan were needed. The offices are along one end of the long side of the building, instead of across the short side. Rail and truck sidings had to be relocated to permit space for plane rollaway. Provision had to be made for separate entrances for plane and auto workers. Such changes, however, are merely deviations from a pattern. By "de-standardizing" design, they may add slightly to original cost, but they are not expected to alter the efficiency of the plant itself.

HOW EFFICIENT IS IT?

To measure efficiency, you need a yardstick. The recent GM Buick-Olds-Pontiac assembly plant at Atlanta provides a convenient comparison. It's a single-purpose plant of 1,000,000 square feet. It is capable of producing 47 assemblies per hour.

If aircraft production at Arlington were zero, 1,085,000 square feet would be used to assemble 35 cars per hour. That's 32.3 cars per million square feet, or 27% less than at Atlanta.

The projected 1953 starting schedules of 20 cars per hour in 885,000 square feet amounts to 22.6 per million, or 52% less than Atlanta.

WHO FOOTS THE BILL?

It's an easy-to-grasp fact that unit costs go up when you spend more dollars per square foot for a plant that produces fewer units per square foot. And if the area permanently assigned to war production is shut down, the cost of that space and the cost of maintaining the tools and equipment stored in it represent non-productive "overhead."

When *some* war production is under way, as at present, it is possible for a company in a dual-purpose plant to recover some or perhaps all of its added cost under the terms of its government contract, accelerated amortization, and renegotiation. But that doesn't do the company any good when military production stops.

Wilson pointed up this fact in a talk to the American Ordnance Association on Oct. 4, 1951:

"Definite agreements and understandings should be worked out by the government, through its defense agencies, with these manufacturers for preserving the possibility of this type of dual operation for at least 10 years and for renewing such agreements for several generations if necessary.

"It would appear to be time for this country to . . . provide legislation . . . to premit long-term contracts . . . for the custody and maintenance of such special or excess manufacturing facilities . . . and which will also permit to the extent possible utilization of dual-purpose plants and facilities at all times in the interests of maximum production and stable employment . . .

"[This] most fundamental and probably the most important element of a sound national defense program has not yet been provided for."

If dual-purpose plants become established national policy, as Wilson suggests, then the taxpayer will foot the bill for the maintenance of the war-production space and equipment, and possibly for the inefficiency of the civilian operation. But this will be in place of footing the bill for idle, single-purpose plants that take months to get rolling.

Up to this time, however, dual-purpose plants are *not* part of established national policy. The long-term agreements Wilson proposed are not possible. Presumably that means GM is gambling that it will retain government aircraft contracts long enough to recover much of its added cost of building and operating the Arlington plant.

There's a second possible reason for the Arlington plant: GM may hope to create a "laboratory" in which to prove to doubters in both Congress and the Pentagon that the dual-purpose plant is a sound investment in national defense.

IS ONE PLANT "A TREND"?

Actually, it's more than just one plant. Arlington is merely the first *new* plant, designed from the ground up with the specific idea that it would be a dual-purpose plant. Other GM divisions, and some other companies have made long strides toward becoming dual-purpose plants when they revamped to take on big military contracts.

But it's still not a trend. Even if it does become a trend, it will affect only the big plants.

Most small plants become subcontractors when war production is needed. Their efficiency as subcontractors depends on their continuing to use the equipment and know-how that has made them effective in their peacetime businesses. The job-shop is automatically a dual-purpose plant.

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2 Valves
Catalog illustrates 2-, 3-, and 4-way valves to control air pressures up to 150 pounds. Details of operating features, and application information. Cutaway drawing illustrates. 8 pages. Bulletin No. 231. Hannifin Corp.

3 Air Valves
Here's a 12-page catalog on air valves. It describes how they're used, gives full specifications and features. Included are hand-, foot-, cam-, solenoid-, and pilot pressure-operated types. Catalog No. 303. Rivett Lathe & Grinder, Inc.

4 Steam Generators
You'll find selection, installation, and operation information in this 28-page catalog on unit steam generators. Engineering data, specifications, and cut-away drawings. Design features and photos, section accessories. Bulletin No. 2000. Preferred Utilities Mfg. Corp.

5 Steam Generators
An 8-page catalog (No. 1050) illustrates and describes a full line of steam generator units. There are sections on construction features, typical boiler room layout, and auxiliary equipment. Specifications and performance charts help you select. Installation photographs complete the picture. Ames Iron Works.

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Information on selection is highlight of this 18-page catalog on translucent rolled glass for diffusion, decoration, protection, heat absorption. Features, specifications, and application data. Series of useful tables too. Mississippi Glass Co.

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DUPLICATE COUPON ON PAGE 226

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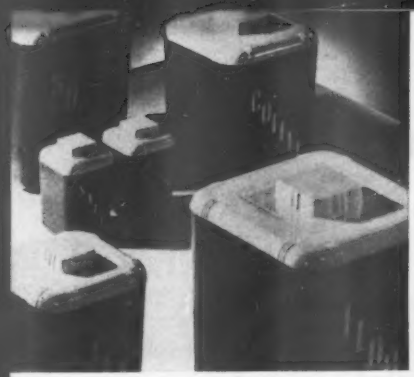
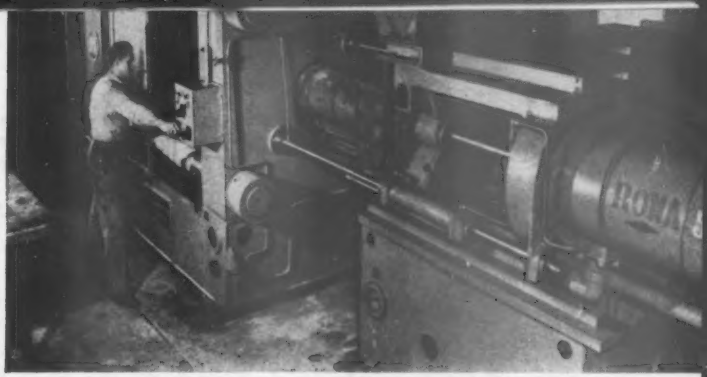
PLANT OPERATING 232



NO MORE PROBLEMS. The production of plastic household items by Rona Plastic Corporation was slowed down by an inadequate hydraulic oil. A switch to Sunvis 999, over a year ago, restored it to normal.



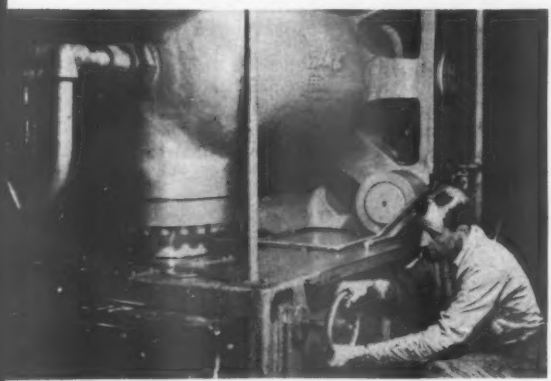
PRESSURE LOSSES ENDED. There are few plastic molding machines as big as this 60 ounce model. It exerts a pressure of 1,000 tons. Because the hydraulic oil formerly used sludged up and thinned out, it could not maintain this pressure. But Sunvis 999 has fully met these severe requirements, as well as those of Rona's nine other hydraulic machines of varying sizes.

PLASTIC MOLDER'S BOTTLENECK ENDED BY SUNVIS HYDRAULIC OIL

More than a year ago Rona Plastic Corporation, New York City, had trouble with its hydraulic molding machines. The machines functioned erratically due to oil sludge sticking the control mechanisms. In addition, the oil thinned out excessively at normal operating temperatures, and resulted in the loss of proper clamping pressures on the dies. To keep the machines going at all, it was necessary to drain, clean, and entirely recharge the systems at frequent intervals.

A Sun representative, called in by Rona, studied the problem and recommended Sunvis 999. He knew it would put an end to pressure losses, because, even at elevated temperatures, it does not decrease in viscosity as much as most other oils. He also knew its exceptional stability would end the sludging problem.

Sunvis 999 proved to be the answer to all Rona's hydraulic oil problems. The original charges, with minimum make-up, are still giving good service. Rona can expect the same performance for a long time to come, because experience shows that under normal operating conditions, Sunvis 900 Series Oils are *good for the life of the equipment.*



NO OIL CHANGES HAVE BEEN NEEDED. Before Sunvis 999 was adopted, the oil in each of the machines had to be changed frequently (the one pictured holds 450 gallons). The original charges of Sunvis 999 have been in use now for more than a year.

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JOE'S DEPARTMENT

ELECTRICAL IDEAS EVERY PLANT MAN CAN USE

By JOE ST. ANDRE • Electrical Editor

New Ideas Get Green Light on West Coast

ELECTRICAL MAINTENANCE PEOPLE out on the West Coast are very lucky fellows. And my hat's off to Leon Dame of Southern California Edison Company. He's the gent who was chiefly responsible for the technical sessions at the recent Industrial Show at Culver City. And they were the real McCoy. Down-to-earth, I mean. I ought to know. I was there.

Thanks to Leon — and the Electrical Maintenance Engineers Association of Southern Cal. — our West Coast friends now have a place where they can rally round and swap ideas. That's more and more important in these days of complex electrical equipment that's rapidly getting complex-er.

LUCKY FELLOWS, INDEED • I found management as a rule very responsive to new ideas and new methods. Traditions are not so firmly rooted in management operations that new ideas have to push their way up through solid concrete before they can hope to even be discussed.

Take electronics. In many parts of the country, that field is treated with passive resistance by electrical departments. It's new. It calls for a new type of electrician. So the old-timers look upon it as something that has to be tolerated. If there is another way to do the job, let's leave electronics alone. That's their attitude.

But electronics is being used extensively on the Coast. Many plants have separate sections in their electrical maintenance department that take care of electronic equipment only.

Another good sign is the recognition of maintenance departments by management. I found plant engineers sitting alongside production managers, not pushed off in some obscure part of the plant.

Plant housekeeping is better on the whole. That's the solid impression I came back home with. No broom pushing. Mechanized cleaning equipment is the order of the day.

THOSE POWER BILLS • Don't think for a minute the West Coast boys haven't got their problems, too. My swing up and down the Coast taught me that. One problem that's bothering a lot of electrical maintenance departments: *How to save money on power bills?*

There's only one way: *Cut out waste of light and power and watch your demand.* The best people to do that are your own maintenance people. They are in your plant 24 hours a day and can really do something about saving power.

What about outside help? Almost every power company has various rate structures that apply to various types of load. Your power company will gladly give you the best rate for your particular service factor. The only trouble is determining in advance just what pattern of load you will take for the coming 12 months.

Obviously, the power company can't change your rate structure every month to suit your particular load factor for that month. If you do decide on a certain rate, you have to stay on that rate for 12 or more months. But in any case your power company is the one that can give you the best advice.

I recall one case I was involved in. The power company approached my company and advised us to change rates based on current operating schedules. Calculations on the previous six months' bills showed that, if we had been on the contemplated rate, we'd have saved $12,000. Our current schedule called for two heavy shifts with a light third shift. At the time the rates had been reviewed, the plant had been on a heavy one-shift operation with the other two shifts very light.

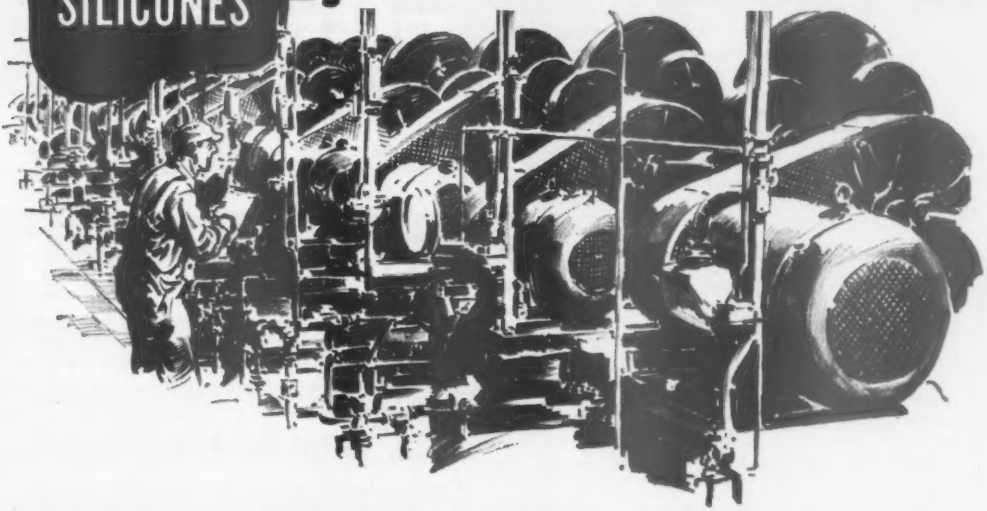
Checking operations for the coming year, management couldn't foresee any change in our method. So we decided to go on the new rate.

It worked fine the first month. But then the plant started to run into shortages of raw materials so that production had to go back to our original schedule of one-shift operation. We then began to lose money on our new rates. However, at the end of 12 months we had saved a little money by going on the new rate.

The moral is that anyone can look back and calculate savings on operations that have gone by

DOW CORNING
SILICONES

give motors more muscles



Gained 30% more pumping capacity; saved about $50,000

Engineers of a leading chemical company had to increase pumping capacity in one production unit by 30%. They did so by having 31 motors with name plate ratings of 50 and 60 hp at 850 rpm, rewound with Class H insulation to put out 75 to 90 hp at 1150 rpm.

New 75 hp motors with conventional insulation plus installation would have cost $68,200. Rewinding, plus installation on the original mounts, cost about $19,000. That's an initial saving of almost $50,000.

Equally important has been the added life and reliability of these Class H motors. The old 50 and 60 hp motors burned out at the rate of one a month or 48 failures in 4 years. Rewound with Class H insulation, these same motors have been delivering at least 50% more power for the past 4 years with only 6 failures.

That's why more and more engineers and management men specify Class H insulation for hard working motors, for critical motors that determine productive capacity, and for motors subjected to high ambient temperatures and excessive moisture or corrosive chemicals.

It has been proved over and over again that Class H insulation made with Dow Corning Silicones has 10 to 100 times the life expectancy of the next best class of insulating materials; can be used to increase the power per pound ratio in electric machines by as much as 50%.

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Please send me:
- ☐ Catalog of Class H Insulating Materials.
- ☐ List of Class H motor repair shops.
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- ☐ 32-page booklet entitled "What's A Silicone?"

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You can also reduce or eliminate motor outages due to bearing failure; specify Dow Corning 44 Silicone Grease for motor bearings.

In open and single shielded bearings designed for high temperature operation, Dow Corning 44 has 8 to 10 times the life expectancy of conventional greases. It gives life-time lubrication in permanently sealed bearings.

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the board. The present can be taken care of by your maintenance department. The future will have to be taken care of by upper management with the advice of the power company.

Return Your Empties

I DON'T MEAN YOUR BEER BOTTLES. I mean your empty cable reels and spools. Your electrical storerooms and shops are probably loaded with them. Don't be surprised if you find a lot of them being used to prop up your electricians in between trouble calls.

The wire and cable manufacturers need those reels and spools. The drum-type reels are of rolled steel and are hard to get. Seasoned spruce is used to make the flanges—and it's getting scarce, too.

Big reels or small—all are needed if you want faster deliveries from your wire manufacturer. So, take another look at the back lot and electric shop. If your electricians need something to sit on, buy them stools. But get those reels back where they belong.

Incidentally, you may have some money tied up in the reels. You get it back only when you return them. So you may end up with money in the bank.

How Foolproof Can We Get?

I'M INDEBTED to the Electrical Equipment Section of the National Safety Council in its recent news letter for the following item on safety:

> The safety director of a plant that does a lot of stamping had a bright idea for making the presses safe to operate. He installed the push-button above the operator's head. To make the machine work, the operator had to reach up and push the button.
>
> This was an improvement, but the worker still had a hand free to get caught in the press. So the next improvement was to install two pushbuttons. The two buttons had to be pressed simultaneously to make the press work. Now the machine was safe.
>
> But an enterprising worker discovered that if he put a pin in one of the buttons he could then operate the press with only one hand and eat his lunch with the other. Of course, he never removed the pin—and one day down came the press on the free hand and off went his fingers.
>
> After much research, the safety director came up with a pinproof control where you just had to use both hands together. No more tampering. The press was at last foolproof—almost, that is.
>
> Oh! yes. The latest accident happened to the operator who used both hands to push the buttons. Only trouble was that his head was inside the press checking on the die. Enough said. The safety engineer is starting all over again.

The above story proves you can't remove the human being from the safety picture. Your best safety protection, bar none, is a rigid set of safety rules backed up with strict enforcement. You need a disciplined working force to make safety devices really foolproof. Back up your electrical department when it complains about safety violations.

Safety *can* be engineered into equipment. Safety *can* be enforced on the working staff. Safety *can* be taught to operating people. I like to think of a safety program where it concerns electrical devices as a combination of all three.

B. Franklin Flies Again

TWO HUNDRED YEARS AGO this year, Ben Franklin flew his kite. On May 28 last I saw Ben perform again. Ben's statue, that is. In Philadelphia, naturally. In the high-voltage yard of GE's new Switchgear Development Laboratory.

Lucky Ben, is all I say. Lucky he didn't turn out to be "poor Richard" on that eventful June day of 1752.

Actually, this re-enactment of Franklin's experiment was only a gimmick to introduce the main event. That was a demonstration I wish all plant operating men could see. It would give them something more than a rough idea of what happens when man-made power generated by the power companies gets out of control or transmission lines are hit by lightning. And they'd see how easily the same forces can be hauled with the right circuit breakers.

It's true that the switchgear in your plant will never be called upon to handle such quantities of power. Don't feel too safe, though. Much smaller amounts of power can easily destroy your electrical equipment, may blow up your whole plant.

As power companies increase their capacities to meet the ever-increasing demands for more and more power by industry, they also increase their capabilities of furnishing the large amounts of power that will flow in case of short circuit in your plant. Your circuit breakers and switchgear had better be of adequate capacity to handle such power.

(You'll find a description of the new GE laboratory facilities and what they can test on page 120 of this issue.)

Air-Borne "Friction Fighter"

Alemite OIL-MIST Lubrication

✻ extends bearing life as much as 17½ times!

cuts oil consumption up to 90%

boosted production 50% at one plant!

Here from Alemite—world leader in lubrication—is lubrication progress so major—so far reaching—as to command the interest of *every* executive concerned with industrial lubrication practices and costs. Alemite Oil-Mist! The most efficient, continuous, fully automatic system in the field of machinery lubrication.

Alemite Oil-Mist! The system that atomizes oil into *mist*—distributes it through tubing to bearings—bathes *all* bearing surfaces with fresh, clean, cool oil film. A system that simplifies and materially cuts the cost of machinery lubrication. And the lubricator unit has no moving parts.

Oil-Mist uniformly maintains oil film on plain and anti-friction bearings, gears and chains *regardless of variations in load, temperature or speed.* Eliminates the "human element."

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Lubricates All Types of Mechanisms

✻ **Reports Like These Prove Oil-Mist Results!**

Before Oil-Mist: 32 Leather Stitchers at an eastern shoe manufacturing company were turning out 80 dozen pair of field boots per day. Pinion gears and other working parts demanded constant oiling . . . constant attention.

After Oil-Mist: The same 32 machines and operators are now turning out 120 dozen pair a day—a production increase of 50%! And vital machine parts are well oiled always — automatically — with Oil-Mist.

Check All These OIL-MIST Advantages!

- Reduces bearing temperatures as much as 20%.
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- Air pressure seals bearings against dirt.
- Reduces oil consumption—up to 90%.
- Prevents product spoilage.
- Eliminates guesswork — each bearing picks up as much Oil-Mist as it needs.
- Reduces starting and running torque.

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Alemite OIL-MIST Lubrication

MAINTENANCE POINTERS

FOR PLANT OPERATING EXECUTIVES

By CARL G. WYDER • Maintenance Editor

Leak detector to spot elusive leak portends . . .

. . . More Use of New Tools to Simplify Maintenance Jobs

Time was when you located leaks in a closed tank by sight or smell. And if the leak was minute, you pumped the tank full of air or water and looked for soap bubbles or spray.

Science has invented better, sure-fire ways. One of them is the G-E type-H instrument shown above locating a leak in the refrigerated 1000-gal. milk storage tank. It will detect leaks so small that in one year only 1/100 of an ounce of a test gas will pass through the opening.

In use, you add a halogen gas tracer (such as carbon tetrachloride) to the tank and pass the probe along the surface. When you hit the leak, a buzzer or a light signals "Eureka!" You can test compressors, condensers, pipes, valves, or any casing that doesn't contain an explosive gas.

Maybe you won't ever need this kind of a detector. But it points to a much-needed lesson. As the automatic factory described in our April issue gradually comes into being, the maintenance department will need to use all the latest tools to speed up repairs and minimize downtime.

The automatic factory will need "automatic" maintenance. Old-fashioned maintenance tools will be fatal to efficient operation.

There Are Good Ideas for You Outside Your Industry, Too

Many plant executives are making a mistake in reading only about the doings in their own industry. Their usual excuse is that no other industry has their special problems. And so, say they, it's a waste of time and of no benefit to read about troubles not your own.

This editor almost made the same kind of mistake only a few weeks ago. We picked up a news release from the Bakelite Company about how a Vinylite resin-base coating saved the cost of a new wood flooring in the Municipal Auditorium in Oakland, Calif. Well, we surmised, that's a problem of the commercial and entertainment field—there's no industry interest here. Let's toss it aside.

But wait a minute. Not so fast. Look further at this report: "The floor was rapidly deteriorating from almost constant use. Previous sanding had left the wood so thin that city officials believed a new floor would have to be laid—at a cost of $100,000 . . . The entire floor was sanded and three coats of Alchemite resin-base coating were applied with mops and handle-type applicators, at a cost of less than $1000 for materials. . . ."

That first coating, says the news release, was more than two years ago. Since that time one new coat has been applied each year directly over the old finish.

Then the report goes on: "Nearly one million persons attend events in this auditorium each year . . . chairs are dragged over the floor almost every day, as well as other equipment such as heavy trucks loaded with machinery for display purposes. The coating is unaffected by spilled food, beverages, water. Burning cigarettes make a light brown mark . . . do not char the wood. Chewing gum is easily removed. Before Alchemite was applied, the floor had to be power-scrubbed every 10 days. Now, maintenance consists of merely sweeping when necessary and washing several times a year!"

Are you impressed with the similarity of this case to industry's problem of maintenance of wood floors? And does it give you any ideas as to how industry might learn something from a case outside its bailiwick? If so, then we've both learned our lesson.

Turn to page 146

Challenging the Industry with the Best Buy in AC Welders!

Offering more welding production, per dollar invested, than any competitive welder in its price class!

Proven in continuous 3-shift operation on world's toughest production welding assignments...equivalent to *years* of normal shop use!

FEATURING:

- **Wide Amperage Range for adaptability to more welding jobs!**
- **75-Volt Open Circuit, eliminating need for starters or other gadgets!**
- **Smoother, higher-quality welds!**
- **Safer, quieter operation!**
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You Can't Buy Better than the A. O. Smith CHALLENGER Production Welder. For literature, write:

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Welding Products Division, Milwaukee 1, Wis.
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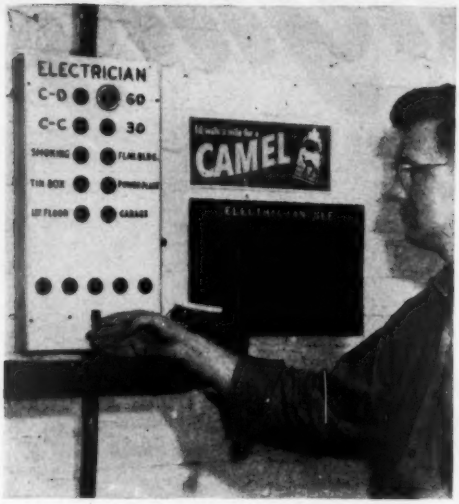
WELDING PRODUCTS

Made by Welders . . . for Welders

MAINTENANCE POINTERS ... *Begins on page 144*



Call box speeds maintenance service because . . .

. . . Production Supervisors Know Where to Find Maintenance Men

Call signal boxes have cut lost time on emergency electrical maintenance calls at the Winston-Salem plant of R. J. Reynolds Tobacco Company. And they make it easier for the area electrician to go next to that job where he is most needed.

This system is installed in a number of the company's multi-story buildings. Actually it could be used just as effectively in any single-story expanse of any plant that has departmental areas.

At Reynolds Tobacco, a call box like the one in the photograph is located on each floor at or near the stair tower. This box has two vertical rows of red neon lights, and one horizontal row. One light in every row represents one of the floors. In this case there are five floors, hence five lights in each row. And there are two main departments on each floor, hence two vertical rows.

When a maintenance electrician starts on a job, he flips a switch on the right side of the box. It turns on a light in the vertical row to show the side of the floor he is working on. This signal appears on all boxes on all floors.

Now if a production supervisor needs an electrician for an emergency, he can tell from the call box where to locate him by telephone or messenger. But if the repair is of a routine nature that can wait awhile, the supervisor flips a switch at the base of the box. This lights the lamp in the lower single row for that particular floor. This signal also appears in each box on each floor, to tell the electrician which floor has a job waiting for him.

Beside each call box is a small blackboard where the supervisor writes a message to the electrician to guide him to the machine or part of the floor where he is needed.

The rest is simple. When the electrician finishes a job, he returns to the call box and flips off his own upper signal. He sees from the lower signal where he is next needed, and goes to the call box on that floor. There he reads his blackboard guide, flips off the supervisor's lower signal, and flips on his own upper signal to show where he is now working.

How Can I Get a Manufacturer to Make His Product Easy to Maintain?

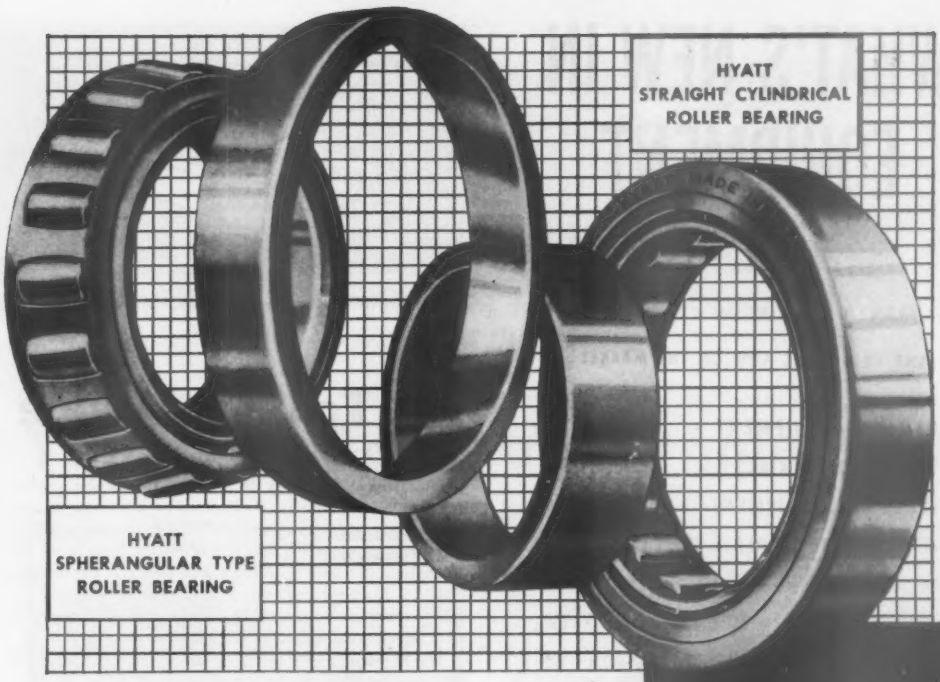
Ever hear a plant engineer or production chief wail about this situation: For some crazy reason, he moans, the stubborn equipment manufacturer won't admit there's anything wrong with his product. Or else he brushes off the suggested improvement as a screwball idea.

Why such disinterest by the maker? When you honestly analyze it, it's largely because the plant man didn't convince the equipment maker he has a legitimate gripe or an easy solution. He didn't *sell* the better idea the right way. After all, the reputable equipment manufacturer is just as anxious to take the bugs out of his product as is the user.

How can you get action without a lot of words and data? Try "before" and "after" photographs. They are your best argument—irrefutable beyond words. In one case we know of, to get at just a few control features that needed occasional servicing you had to disassemble an entire complicated control cabinet. What a fancy deal! The maker had designed the contraption for easy, quick assembly. Everything was interlocked, without removable screws. Connections were crimped, plates were dovetailed. If you did manage to get the front cover off, the whole thing fell apart.

The solution was simple: install a hinged cover over that small part of the controls that needed occasional servicing. That's just what the plant engineer did. Now, do you question how effective a photo of an improvement like this can be in selling the idea *at first try* to the maker? It's sort of a Q.E.D. which pulls the rug out from under the well-worn excuse that your idea isn't any good because it can't be done. I bet you the designer's jaw drops when he *sees* what you have done.

Turn to page 228 for good ways to solve special plant engineering problems



We've learned a lot about roller bearings and their application during the past sixty years.

Working together with many equipment builders in many industries, we have studied and solved a good number of problems in product design and bearing application.

Out of this continuing interchange of ideas, we have accumulated a great fund of engineering knowledge. As a result, many apparently difficult problems in bearing application quickly lend themselves to simple, practical solutions that are born of experience.

Why not take advantage of Hyatt experience? If the equipment you build or use operates on anti-friction bearings, you may be able to save yourself time and money.

For information about the complete line of Hyatt Roller Bearings write for Catalog 150. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

A fund of
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experience
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to use

HYATT ROLLER BEARINGS

WHAT'S NEW IN EQUIPMENT

. . . BRIEFED HERE FOR THE CONVENIENCE OF PLANT OPERATING MEN IS INDUSTRIAL PLANT EQUIPMENT NOW ON THE MARKET . . .

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MISCELLANEOUS 194

IN THE NEXT ISSUE ..... Some notes on important late items. More about them next month.

Full-course lunch from a machine will be a feature of the factory of the future. But you can have it in your plant today with a Lunch-O-Mat. One of these compact vending machines dispenses fruit juice, hot and cold sandwiches, pie, milk, and coffee and makes change on the side.

Lunch-O-Mat Corp. of America, 2112 Broadway, New York 23.

Quikupl fittings join tube or pipe without threading, flaring, brazing, or welding. You make a high-pressure, leak-proof joint simply by tightening a screw. As a result you cut assembly costs and use less expensive, light-wall tubing.

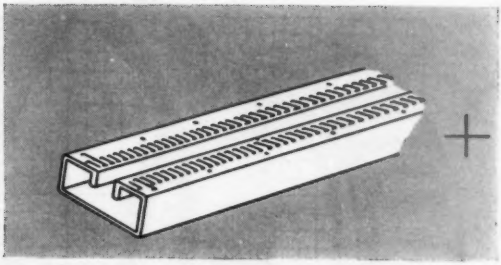
Peter A. Frasse & Co., Inc., 17 Grand St., New York 13.

With pallets, panels, and posts in the Erect-A-Pallet system you can set up handling boxes and storage racks to suit specific needs. You can quickly make 4-, 3-, or 2-sided boxes, or stake pallets.

Phillips Mine & Mill Supply Co., 2324 Jane St., Pittsburgh 3.

Color Strip-Film Projector for plant training lectures and demonstrations projects up to 500 pictures, one frame at a time, on a self-enclosed screen. The Adslide projects automatically, but there's a remote control switch for manual operation, too.

Adslide Projector Co., 3726 W. Monroe Ave., Chicago.



STEEL CHANNEL, half the weight of angle iron, plus . . .

. . . Tailor-Make

Your own ingenuity is all that limits the many uses of Mult-A-Frame. That's the way the Ainsworth Manufacturing Corp. designed its new framing system—as a versatile erector set to help solve a variety of plant handling and storage problems.

With a minimum inventory of parts and a standard wrench as your only assembly tool, you can put Mult-A-Frame channel together as:

Racks—for pipes, pallets, reels, stampings, and castings of any shape and size.

Hangers and supports—for lighting fixtures, bus bars, heaters, and ventilators.

Frames—for workbenches and tables, handrails, ladders, scaffolding, and machine mounts.

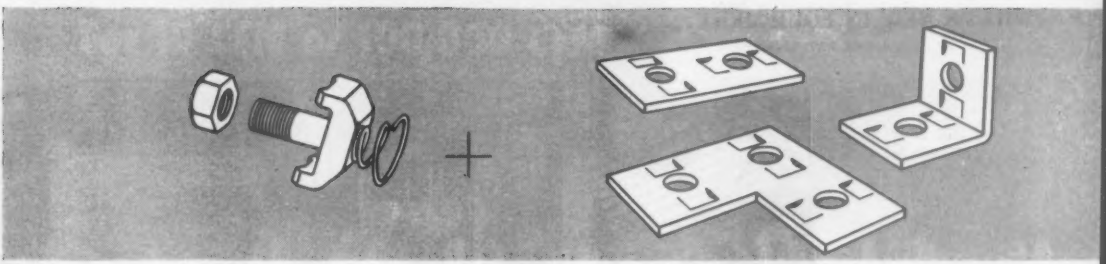
To make it worth while for you to use Mult-A-Frame in all these applications, Ainsworth has designed its framing system for the utmost simplicity. The big bonuses claimed for Mult-A-Frame are:

- **Low parts inventory.** The three basic components—steel channel, bolts, and fittings—have been standardized to permit a wide range of construction with a minimum stock of parts.
- **Wide range of size and shape.** Flat, angled, and bent fittings permit almost limitless combinations of Mult-A-Frame channel.
- **Ease of assembly.**

To put Mult-A-Frame channel together you first insert the spring-loaded T-bolt into the channel slot, then give it a quarter turn. Spring pressure forces the four contact points of the bolt head into the serrations on either side of the channel slot. While the spring holds the bolt in place, you can slip on the proper fitting and fasten it down. Embossed lugs on each fitting rest snugly into the channel slot, adding rigidity to the structure.

The channel comes in several sizes and weights that can be used in combination. You cut your channel from standard lengths as you need it. Channel serrations are spaced at ⅛-in. intervals, and whole inches are marked with embossed dots.

Ainsworth Mfg., Corp., 2200 Franklin St., Detroit.



. . . **SPRING-LOADED BOLTS** for fast assembly, and . . . . . **A WIDE VARIETY OF FITTINGS** permit you to . . .

Your Own Racks and Frames Fast

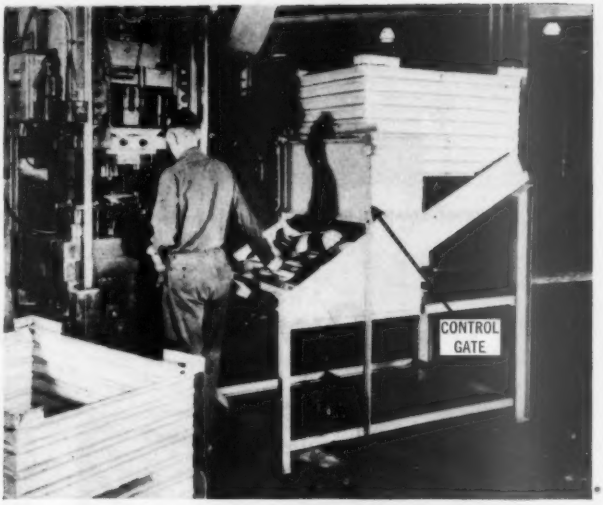
STORAGE RACKS can be custom-built for almost any shape part. Racks like this one can be constructed for easy stacking.

COMPLICATED PRODUCTION RACKS are assembled fast with Mult-A-Frame. A wrench is the only tool used.

A-FRAMES or similar racks with angled supports pose no special problem. It's just a matter of choosing the right fitting.

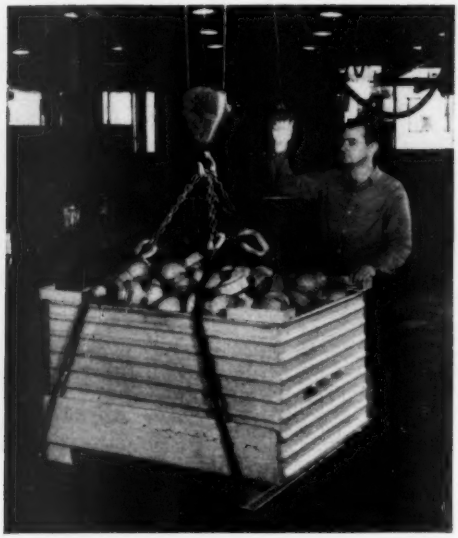
Turn the page

SIDE DUMPING of Work-O-Matic box permits discharge in tight quarters. Auxiliary lift grips side lugs to dump box.



CONTROLLED DISCHARGE of box from stand is made possible by control gate. Setting of gate depends on part size.

Handling Box Learns New Tricks



OVERHEAD CRANE TRAVEL adds another element of flexibility to Work-O-Matic box. Box legs are notched to hold sling.

Just a year ago Union Metal Manufacturing Co. developed a handling box with built-in dumping. The Work-O-Matic box looked like a good bet to simplify plant handling—especially on moves from storage to production lines. But since then Union Metal has added some extra features that should really make the Work-O-Matic an all-round plant handling system.

The original Work-O-Matic was designed to eliminated an intermediate handling operation—the manual removal of parts from boxes at point of use. The box with the hinged drop bottom could be discharged directly from a fork truck or from a special positioning stand.

Now in addition the Work-O-Matic handling system has been given:

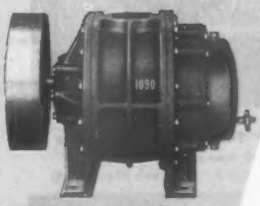
- A side-dump attachment that permits sidewise dumping to right or left in tight quarters.
- A new positioning stand with a control gate. Proper gate setting permits even discharge of small or large parts.
- Notched box legs that permit safe travel by crane sling.
- Special trailers for moving the boxes around the plant in train loads.

The Union Metal Mfg. Co., Canton, Ohio.

Turn the page

For 10 CFM or 100,000 CFM ...compare blower values

ROTARY



Typical low-capacity R-C Rotary Positive Blower. Sizes range from 5 cfm to 50,000 cfm, permitting selection closely matched to needs.

- ☐ Choice of Rotary or Centrifugal
- ☐ Capacity matched to the job
- ☐ Easy accessibility
- ☐ Ruggedness
- ☐ Ease of installation
- ☐ Ability to handle overloads
- ☐ Long-time durability
- ☐ Freedom from breakdowns
- ☐ Low maintenance costs
- ☐ Engineering assistance
- ☐ Proved reputation of maker
- ☐ Customer satisfaction

No need to take chances when buying blowers, exhausters or gas pumps. Just put this "detector test" to work on your specific problem and you'll arrive at the most satisfactory answer.

For instance, if you're debating between Rotary Positives and Centrifugals, remember that only Roots-Connersville builds both—the exclusive *dual-ability line* that permits unbiased recommendations. Their wide range of capacities supplies sizes and types that are quite likely to be most closely matched to your needs.

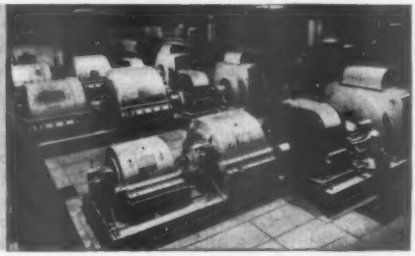
For economy of operation, reliability and low maintenance, we refer you to a list of users that dates back almost a century. If you'll rate your possible choices on a performance basis, you'll usually find R-C equipment "tops" on the list.

To help you make the most profitable, practical decision, our experience is at your service.

ROOTS-CONNERSVILLE BLOWER CORPORATION
525 Central Avenue, Connersville, Indiana

CENTRIFUGAL

Six R-C Multi-Stage Centrifugal Blowers equipped with automatic regulators to provide extremely wide range of operation at various pressures and capacities.



Reg. U.S. Pat. Office

ROOTS-CONNERSVILLE BLOWER

BLOWER BUILDERS SINCE 1854

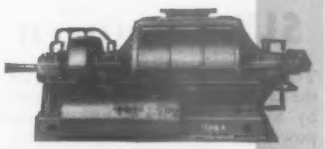
A DIVISION OF DRESSER INDUSTRIES, INC.

THE *DUAL-ABILITY* LINE OF MODERN EQUIPMENT TO HANDLE GAS AND AIR

Multi-Stage Centrifugal Exhausters

Single-Stage Centrifugal Blowers

Rotary Positive Blowers



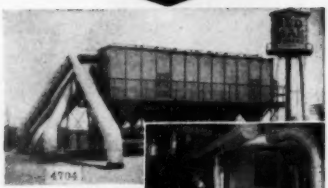
Rotary Positive Gas Pumps

Positive Displacement Motors

Inert Gas Generators

SLY

Pioneers and Leaders in INDUSTRIAL DUST CONTROL



SLY Dust Collector on roof at Pinkerton Tobacco Co. plant. Tobacco cleaning machines with dust pipes to Collector.

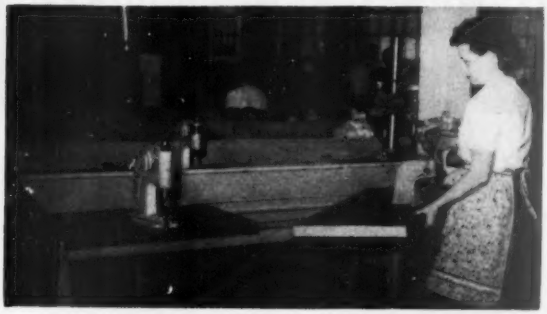
Have You A Difficult Dust?

SLY CAN COLLECT IT

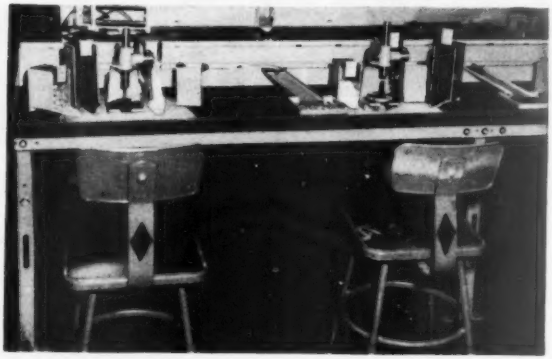
Tobacco dust is only one of the *difficult* dusts being collected by Sly Dust Filters. Others are powdered sugar, bentonite clay, paint and pigments, aspirin and other pharmaceuticals, chemicals of all kinds, talc, lime, detergents. Designed and engineered so that they save on space and power, Sly Dust Filters require less attention, less maintenance, yet — they are not expensive.

Sly Dust Filters are used to collect more than 100 kinds of dusts — and they get *all* the dust by filtration through cloth. Ask for Bulletin 98 and tell us your dust problem. Our experience with thousands of installations is at your disposal.

THE W. W. SLY MANUFACTURING CO.
4755 Train Avenue • Cleveland 2, Ohio
New York • Chicago • Philadelphia • Syracuse
Detroit • Buffalo • Cincinnati • Minneapolis
St. Louis • Birmingham • Los Angeles • Toronto



STARTING AN ASSEMBLY LINE FROM SCRATCH, operator slides individual work centers into Alden's basic work frame.



FINISHED LINE is put together in a matter of minutes. It is an integrated assembly set-up, complete with parts hoppers, belt conveyor, and feed chutes.

Quick Set-Up Assembly Lines

To permit quick set-up and relayout of assembly lines, the Alden Systems Company has developed an "erector set" work center. In the Alden system you set up each work station on an 18x28-in. masonite board. Then insert the boards in desired sequence into a basic steel work frame. This basic frame can be adjusted in height, is pre-wired for 110 volt a-c, and has holes for 220 volts, gas, water, and air supplies.

Key to the Alden system is its flexibility. Changing lines just means changing boards. Boards are expendable, so you can cut and drill them at minor expense. And once used, board set-ups can be filed for future need.

Actually Alden can supply components for a complete assembly line. Accessories such as ready-count parts hoppers, belt conveyors, and feed chutes can make any one of their line set-ups an integrated assembly operation. For complete details on the many variations of the Alden system send for the company booklet.

Alden Systems Co., Alden Research Center, Westboro, Mass.

Turn the page

Efficiency increases

2½ times with bench-mounted Keller Air Tools

KELLER PNEUMATIC SCREW DRIVERS

- Light weight and balance assure easier handling, less worker fatigue
- Simple design and construction mean fewer breakdowns, less maintenance cost

- Interchangeable parts provide easy adaptability from job to job

ABOVE is part of the assembly line in a factory that makes automobile ash trays. Mounted on the bench in front of each worker is a Keller pneumatic screw driver.

As parts move along the conveyor belt, they are picked up and fastened together with tiny screws. Formerly these screws were run down by hand—tedious, time-consuming work that job analysts rated at only 50% efficiency.

With these air-powered Keller Screw Drivers, screws are run down with a single hand motion—pressing the assembly against the screw driver bit.

Efficiency rating of the department has jumped to 225%—2½ times better—substantially better than the experts anticipated. Naturally, the girls are proud of their record, and they say their work now is much easier.

Are there places in your shop where Keller Air Tools could increase production efficiency? Why don't you give them a chance?

KELLER

Pneumatic Tools

KELLER TOOL COMPANY, GRAND HAVEN, MICH.

THOMAS
Flexible ALL METAL
COUPLINGS
FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

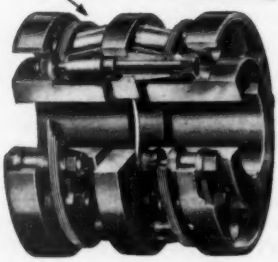
Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years

BACKLASH
FRICTION
WEAR and
CROSS-PULL
are eliminated
Lubrication is not required!

PATENTED FLEXIBLE DISCS

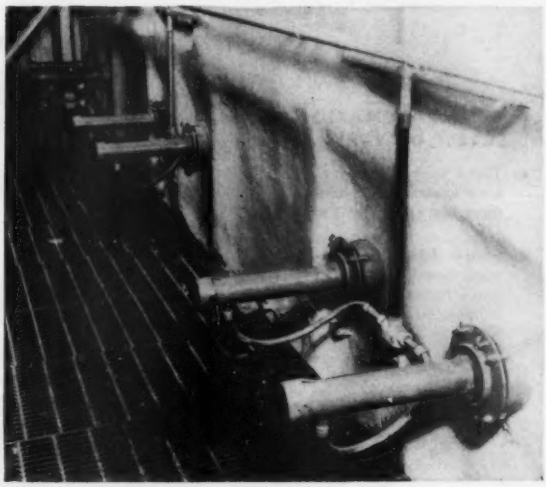


THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.
NO MAINTENANCE PROBLEMS.
ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

AUXILIARY EQUIPMENT



ELECTROMAGNETIC RAPPERS continuously rap electrostatic precipitator plates. They eliminate intermittent dust build-up on collector plates and provide an automatic means for . . .

Efficient Precipitator Maintenance

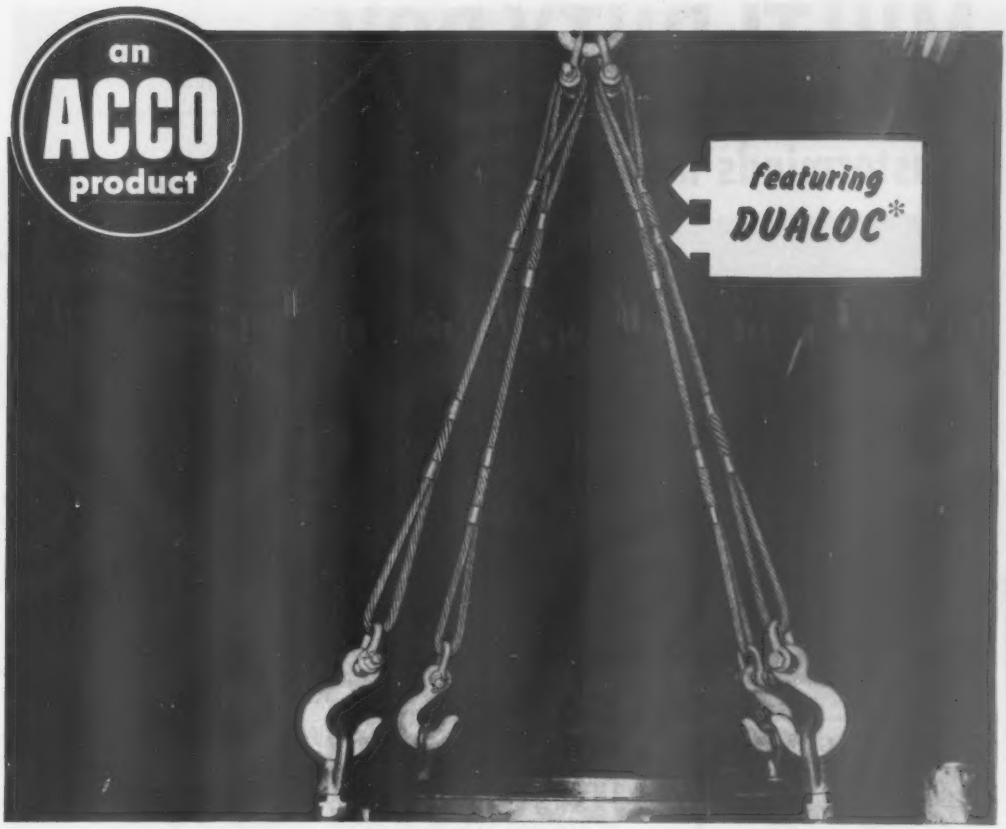
With Research Corp.'s magnetic impulse rappers, electrostatic precipitators can operate at maximum efficiency around the clock. For the MI rapper raps collector plates continuously, not in intermittent cycles—thus keeping dust build-up on the plate to a minimum. The Research Corp. says that its new system of precipitator rapping offers:

- More efficient precipitator performance. With negligible dust build-up, plates operate at high efficiency at low power input.
- Lower operating costs. Automatic rapping requires no labor, almost no supervision.
- Reduced maintenance of the rapping system itself. It's an all electric system of simple design.
- Elimination of stack dust loss that might result from intermittent plate rapping . . . or the elimination of shutdown where equipment is taken out of the line for rapping.

The MI rapping element, a solenoid-actuated plunger, can be quickly installed on any standard electrostatic precipitator. A central pulse generator delivers the tripping impulse to each of 12 or more of these rappers at intervals of 5 seconds or more. A separate remote control unit permits monitoring of the rappers from any convenient plant location.

Research Corp., 405 Lexington Ave., New York.

Turn the page



ACCO Registered DUALOC Slings are Lifting Tools

● DUALOC Slings, whether strand-laid or cable-laid, provide the material handling engineer with a tool of known strength and safety factor throughout. The design is modern . . . tested . . . and proved in service.

The DUALOC Ending insures sling strength equal to the FULL catalog strength of the wire rope, and the "Registry" specification requires that all fittings have strength equal to that of the wire rope. These are the basic reasons why ACCO *Registered* DUALOC Slings have set industrial sling standards.

You can get DUALOC Slings and Fittings from the stock of your ACCO Sling distributor. See him today or write our nearest district office for his name.

*Trade Mark Registered Patent No. 2463199

ACCO

TRADE MARK

WIRE ROPE SLING DEPARTMENT
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO Registered DUALOC Slings

MULTI-DUTY BOX
masterminds materials handling

BOOSTS PRODUCTION!

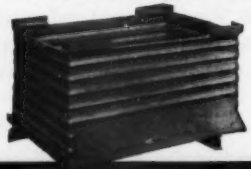
THIS Work-O-Matic Box increases materials handling efficiency—boosts production and reduces costs—more than any box you've ever used. It does all the usual box jobs—moving and tiering unit loads. But see what *more* it does!

When fork-lifted onto Union Metal's specially designed Positioning Stand, the drop bottom automatically discharges parts into a tray—at work-level height!

When the Work-O-Matic Box is empty, it is replaced with a loaded one *without interrupting work*—because the tray still holds an ample supply of parts. Result—operator and machine receive a *continuing* supply of materials. No waiting. Costly downtime is cut.

Get full details. Write for illustrated Folder MH-809 and typical T & M Studies — *see* how you can save! The Union Metal Manufacturing Company, Canton 5, Ohio.

Work-O-Matic Box and Stand Patent No. 2,445,038. Other patents pending.



UNION METAL
Materials Handling Equipment

NEW AUXILIARY EQUIPMENT

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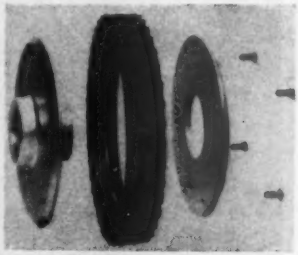


Abrasive Belt Wheel With Replaceable Rim

The Rubber-Rim contact wheel for abrasive belts has two basic members—a steel rim onto which the rubber wheel has been molded and a set of flanges which hold the rubber rim in place.

Advantages of this design are said to be two:

- First of all the unit is lighter than conventional solid disc wheels.
- And you can quickly replace the Rubber-Rim when it is worn or damaged. So wheel costs go down. Wheel inventories do too, because of the reduced downtime for wheel repair.

You can get these wheels in cog-tooth, regular 45-degree serrated, and straight face design—14-in. and 16-in. diameters.

Behr-Manning Corp., Troy, N. Y.

■

A COOLANT PUMP MAGNET that collects steel chips and grindings before they can be pumped back into the system is being sold by the Multifinish Mfg. Co., Magnetool Div., Dept. 366, 2114 Monroe Ave., Detroit 7. Maker says the cylindrical magnet can be easily installed in your coolant tank under the pump intake. You unload collected chips by pushing a wiper ring across the magnet. It's recommended for toolroom grinders and lathes, or for light production drilling and tapping.

Turn the page

Westinghouse-Sturtevant fans are used in this special Environmental Test Chamber that duplicates air conditions from sea level to 20 miles up for testing RCA electronic equipment.

HOW DO ELECTRONIC DEVICES BEHAVE

70,000 FEET UP?

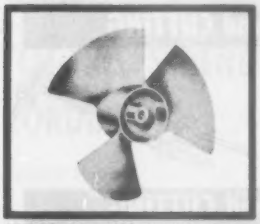
Lives depend on the answers found in this atmospheric testing chamber in type-test laboratories of RCA's Engineering Products Department. But the answers aren't easy to get. For the big problem is to duplicate as accurately as possible the thin, cold air of high altitudes.

The solution? Powerful Westinghouse-Sturtevant Axiflo Fans constantly circulate chilled air, force temperatures down as low as –85°F. Working against a partial vacuum, created to simulate low pressures encountered in the upper regions of the stratosphere, these fans keep temperatures uniform to within several degrees by providing a homogeneous mixture of air throughout the chamber.

No matter how you want to *put air to work*—whether air handling, air conditioning or air cleaning—Westinghouse offers you a complete line of industry-proven equipment to fill your needs. For complete details, call your local Westinghouse-Sturtevant office. When you do, also ask for new General Catalog 600—a 60-page reference file for Putting Air To Work. Westinghouse Electric Corp., Sturtevant Division, Hyde Park, Boston 36, Mass.

Test Chamber designed and installed by Tenney Engineering, Inc., Newark, N. J.

Axiflo Pressure Fans find wide use throughout industry because of adaptability to duct systems and for discharge against high winds.



3-Bladed Aluminum wheel is non-sparking, corrosion-resisting; handles large volumes.

8-Bladed Steel Wheel is non-overloading, quiet and stable; ideal for high temperatures.

YOU CAN BE SURE... IF IT'S **Westinghouse**

J-90267

AIR HANDLING

TUNE IN ON HISTORY! Only Westinghouse brings you complete coverage of four-month political campaign over CBS television and radio.

Dockson Torches

for Oxy-Acetylene

WELDING

and CUTTING

and CUTTING ATTACHMENTS

are Built for Better Service

THERE IS A DOCKSON DISTRIBUTOR NEAR YOU —name upon request

Dockson CORPORATION
3839 WABASH • DETROIT 8, MICH

NEW AUXILIARY EQUIPMENT

Begins on page 154

Hi-Frequency Heater Has Short Set-up Time

The Lewis 1500 high-frequency electronic heater is geared for fast heating of both ferrous and non-ferrous parts. The unit is controlled by an automatic timer that you can pre-set at from zero to sixty seconds. When each object to be heated is placed in turn within the copper work coil, the timer is activated at each exposure simply by pushing a button.

Additional coils and accessory equipment give the unit a wide range of heating applications. Even pre-assembled or pre-positioned parts may be heated while in motion on a conveyor or turntable.

Unit output is 1500 watts into a standard NEMA load. The heater operates at 4 megacycles with a supply of 220-volts, 60-cycle, single-phase. You can use it for soldering, brazing, annealing, and other controlled heat applications. Unit weighs 350 pounds, cost 5¢ per hour to operate, says the maker.

Lewis Machine Co., Dept. KP., 892-4 Newcomb St., St. Paul 6, Minn.

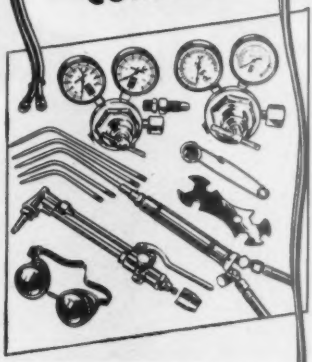
■

Vacuum De-aerator Prevents Corrosion

Permutit's new vacuum de-aerator removes oxygen and free carbon dioxide from plant water, and thus helps protect piping, steel tanks, and other equipment from corrosion. Maker recommends the de-aerator for surface water supplies that have to be pumped great distances, for water used in air conditioning unit coolers or condensing units, and for water that may be subsequently heated in tubular heaters or heat exchangers.

The vacuum de-aerator differs from those used for steam boilers. The latter usually heat the water to remove soluble gases. The new

FOR OXY-ACETYLENE WELDING and CUTTING



DOCKSON'S № 145 OUTFIT

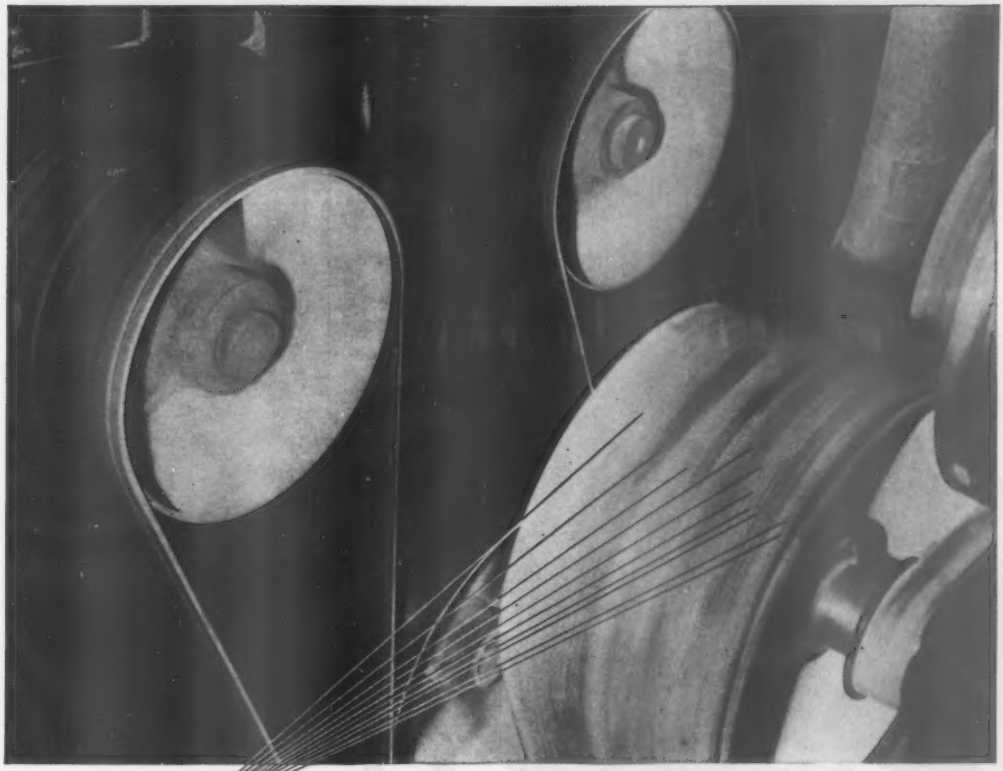
fitted for a complete range of all-purpose welding and cutting operations as heavy as 5" steel.

No. 145 OUTFIT includes:

1—No. 4-E-C Hi-Speed Welding Torch.
1—Ea. Nos. 2, 4, 6, 8 and 10 "E" Style Elbow Tips.
1—C-4 Hi-Speed Cutting Attachment.
1—C-2 Cutting Tip.
1—No. 134-BE Oxygen Regulator, 200 lb. and 3000 lb. gauges.
1—No. 134-AD Acetylene Regulator, 60 lb. and 500 lb. gauges.
1—Commercial to P. O. L. Adaptor.
1—12½ ft. length ¼" Siamese Hose.
4—Hose Connections.
1—Outfit Wrench.
1—Round Flis Gas Lighter.
1—Pr. Series 66-19-6 Welding Goggles.

THERE IS A DOCKSON DISTRIBUTOR NEAR YOU — Let us send you his name and our catalog of Welding and Cutting Equipment, a complete line "BUILT FOR BETTER SERVICE".

Dockson CORPORATION
3839 WABASH • DETROIT 8 MICH



SINEWED for extra STRETCH-FREE STRENGTH with DU PONT "CORDURA"!

Stretch and slippage are virtually eliminated in leather belting reinforced with this Du Pont High Tenacity Rayon yarn.

Thin cords of "Cordura" placed between laminations of leather in a belt add stretch-free strength to leather's natural hold. Yarns of "Cordura" are much stronger than yarns of natural fibers, because "Cordura" is made in continuous filaments. There are no short ends to pull apart under stress. Belts require fewer take-ups, less maintenance.

You'll find "Cordura" in a wide variety of products today . . . the unseen component that makes truck tires stronger and safer at high speeds, hoses lighter yet tougher, conveyor belts more flexible, with better troughability.

Send the coupon now for the free booklet "Sinews for Industry." It tells how "Cordura" improves products you use, and may also suggest improvements in products you make.

"Cordura"

STRENGTH AT LOW COST

HIGH TENACITY RAYON

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Textile Fibers Department
E. I. du Pont de Nemours & Co. (Inc.)
Room 4421F-2, Wilmington 98, Del.
Please send me the free booklet "Sinews for Industry."

Name_____ Company _____

Address_____

City_____ State_____

One glance tells you just how the Randolph operates—no instructions, no explanations necessary! That's why *anybody* can get a Randolph into action fast! No valves to turn, no nozzles to adjust; just point and press your thumb and Randolph's cloud of snowy CO_2 kills fire instantly!

Non-damaging Randolph CO_2 evaporates without a trace, is non-toxic, won't conduct electricity, deteriorate or freeze. And *all* Randolph Models are Underwriters' Approved.

A COMPLETE LINE OF EXTINGUISHERS AND AUTOMATIC SYSTEMS

Learn how Randolph gives your plant panic-proof, split-second protection against flammable liquid, electrical and other hard-to-handle fires! Write Randolph Laboratories, Inc., 4 E. Kinzie St., Chicago 11, Illinois.

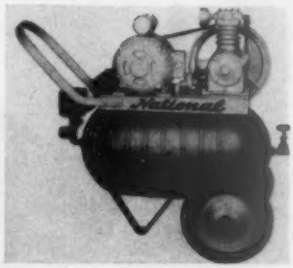
NEW AUXILIARY EQUIPMENT

Begins on page 154

de-aerator accomplishes the same thing in reverse by lowering the boiling point in a vacuum. This permits economical treatment of water that must be used again cold.

The Permutit Co., 330 W. 42nd St., New York 36, N. Y.

■



Lightweight Automatic Compressor

This heavy-duty portable compressor has a capacity of 2½ cfm. at 100 psi. It's a single-stage, single-cylinder compressor with 2-in. bore, 1¾-in. stroke. It's powered by a ½-hp., 115/230-volt, single-phase motor. Complete unit weighs 125 pounds.

Compressor has an automatic air pressure regulator. Unit is equipped with a pressure gage, safety valve, drain cock, semi-pneumatic, rubber-tired steel wheels, and an 8-in. plug-in extension cord. Price: $160.

National Tool & Equipment Co., 1807 W. Lake St., Chicago.

■

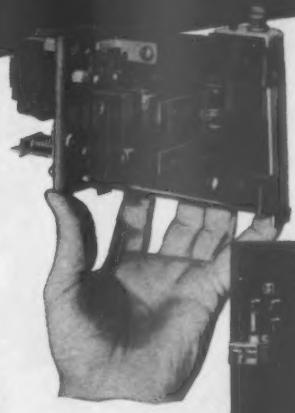
WATER FILTERS with capacities from 5 to 100 gpm. have been developed from the Synclinal oil filter line of the Marvel Engineering Co., 627 W. Jackson Blvd., Chicago 8. Units are available for sump or line operation. Monel filter mesh sizes range from coarse 30 to fine 200. Workmen can clean and reassemble these simple filters on the spot, says maker.

Turn the page

NON-STOP OPERATION SAFEGUARDED

by EC&M THERMAL-MAGNETIC OVERLOAD RELAYS

set at 90% to 110% full load current



¾ rear view shows independent thermal and magnetic tripping elements — both are adjustable. Relay is front-connected, removable as a unit from the mounting-base.

In a certain chemical processing cycle motor-drives operate up to six months without stopping. Continuous operation is essential until the product is completely processed and the machines cleared. Ambient temperatures are high.

To safeguard the insulation of these motors—by keeping temperature rise within safe limits—EC&M 2300 volt Motor Starters with EC&M NEW Type ZTM THERMAL-MAGNETIC Overload Relays were chosen.

These new Relays couple motor current directly to thermal action through a transformer for quick, positive response. Depending upon the motor load and ambient temperature, the thermal element of these Relays is adjusted from 90 to 110% Full Load Motor Current. Thermal reset time is short. Magnetic instantaneous operation minimizes damage under fault current conditions.

For improved motor protection, investigate EC&M THERMAL-MAGNETIC Overload Relays.

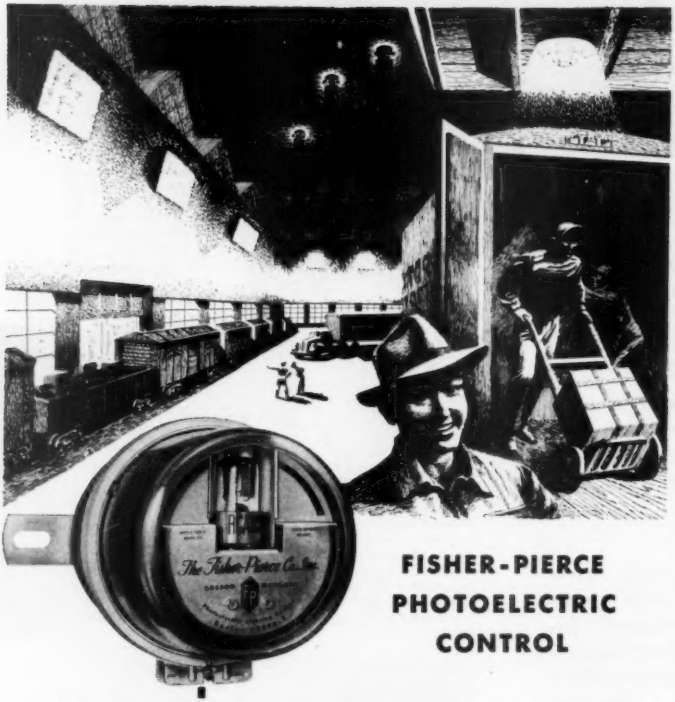
Type ZTM Overload Relay Panel with Time-Delay Under Voltage Protection feature is mounted in the lower compartment of EC&M 2300 volt Full Voltage Starters.

Write for your copy of Bulletin 1180-326

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

for OUTDOOR LIGHTING
when you need it



FISHER-PIERCE PHOTOELECTRIC CONTROL

For Automatic Control of Lighting in:
PARKING LOTS
SHIPPING AREAS
FACTORY YARDS
STORAGE AREAS
OUTDOOR PRODUCTION LINES
PROTECTIVE LIGHTING SYSTEMS

For Aircraft Obstruction Light Control
SMOKE STACKS
RADIO TOWERS
HIGH BUILDINGS
BRIDGES
ELEVATED TANKS

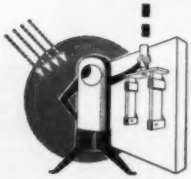
Fisher-Pierce Controls provide lighting safety and economy because lights are on *when and only when needed*, regardless of time of day or weather conditions. Because the control is photoelectric, it depends only on natural light values for operation. There is no mechanical device to get out of phase with actual daylight conditions.

LOW COST — F-P Controls provide true economy. Purchase price is low — installation and maintenance negligible.

EASY TO INSTALL — complete installation can be made rapidly by your own plant electrician.

PROVEN — The control is a modification of the well-known Fisher-Pierce Photoelectric Control for Street Lighting. There are now more than 35,000 of these controls in use by over 700 utility companies.

Write for detailed information.



The FISHER-FP PIERCE CO., Inc.

98 Pearl St., So. Braintree, Boston 85, Mass.

WHAT'S NEW IN EQUIPMENT
Begins on page 148

BUILDING MATERIALS

Glass Block Ventilator

Now you can have solid glass block panels with built-in ventilation. The trick has been turned by a hinged glass block called Panel-Vent.

Actually Panel-Vent is only half an Insulux block mounted in an aluminum block-size frame. A stainless steel handle on the inside swings the block outward on its hinge.

You can use Panel-Vent in existing panels as well as in new construction. The maker says it's laid in the same manner as a standard glass block.

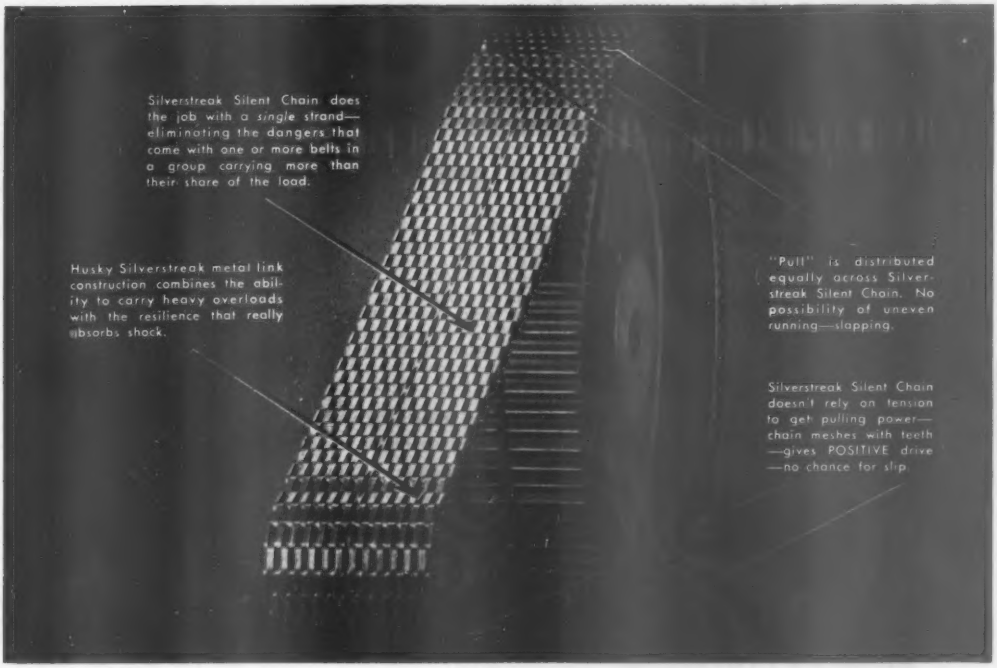
American Structural Products Co., Ohio Trust Bldg., Toledo 1, Ohio.

■

SILICONE WATER-REPELLENT called Hydrocide S. X. Colorless makes a duck's back out of porous masonry after just one application, claims L. Sonneborn Sons, Inc., Building Products Div., 80 8th Ave., New York 11. It helps keep plant buildings clean, too, by shedding dirt, preventing efflorescence.

Turn the page

Here's the proved way to transmit high hp at high speeds...


Silverstreak Silent Chain does the job with a *single* strand—eliminating the dangers that come with one or more belts in a group carrying more than their share of the load.
Husky Silverstreak metal link construction combines the ability to carry heavy overloads with the resilience that really absorbs shock.
"Pull" is distributed equally across Silverstreak Silent Chain. No possibility of uneven running—slapping.
Silverstreak Silent Chain doesn't rely on tension to get pulling power—chain meshes with teeth—gives POSITIVE drive—no chance for slip.

Link-Belt Silverstreak Silent Chain drives are slip-proof...slap-proof...shock-proof

ON thousands of applications . . . under all types of operating conditions—Link-Belt Silverstreak Silent Chain Drives have proved their effectiveness and durability. High horsepowers and high speeds are delivered with the same trouble-free efficiency (over 98 per cent) as on less demanding loads. There's a power-transmission engineer in the Link-Belt office near you.

LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

02.020

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, Factory Branch Stores and Distributors in Principal Cities.

As it has since 1940, a touch of the control button brings exact press speeds at the New York Herald Tribune. In those 12 years, there has been no replacement required on the two 100 hp Silverstreak Silent Chain Drives that power this press at chain speeds up to 3664 fpm.

tangle-proof power line for moving machinery

APPLETON REELITE

TRADE MARK

CONSTANT DUTY

You can cut cable costs, speed work and prevent delays and accidents when power for your mobile electrical machines is supplied through Appleton Constant Duty Reelites. These ruggedly built Reels automatically take up and pay out conductor cable—hold cable gently taut, preventing breaks, kinks, tangles. For use with hoists, lifting magnets, cranes, chargers, generator sets—an endless variety of machines requiring flexible power supply.

APPLETON ELECTRIC COMPANY
1715 Wellington Avenue • Chicago 13, Ill.

Field Engineers in All Principal Markets

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Write for complete Catalog information

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES
EXPLOSION-PROOF FITTINGS • REELITES

ELECTRICAL EQUIPMENT

Outdoor Power Circuit Breakers

New outdoor power circuit breakers, additions to the G-E Type FK-439 line, are available in ratings of 14.4 to 46 kv., 600 and 1200 amperes, and interrupting ratings from 250 through 1500 mva.

New oil-blast interrupters used in these breakers are designed to reduce oil carbonization by interrupting fault and load currents with short arc lengths and low arc energy. The interrupters have silver-molybdenum contacts for low contact resistance and minimum erosion of contact material during arc interruption. You can easily remove them for contact inspection without disturbing breaker adjustments.

The operating mechanism of the breaker is pneumatically trip-free. The unit has a float-type oil gage and provision for two current transformers per bushing. Oil-filled bushings with center-clamp construction are free of any cemented joints.

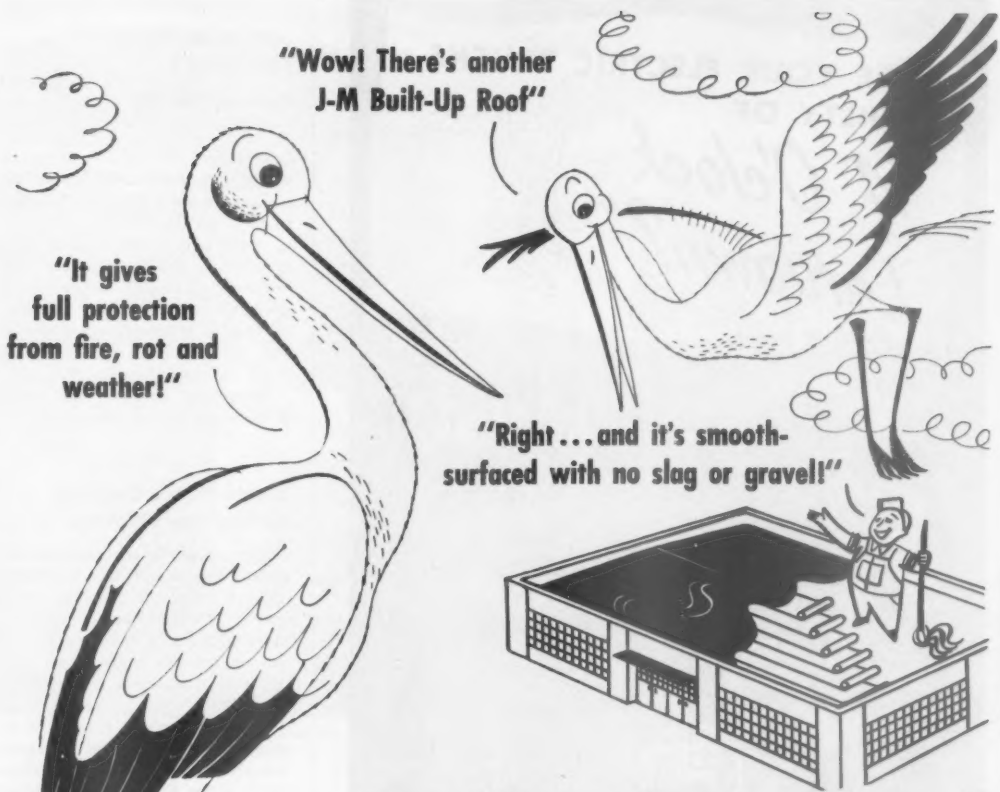
General Electric Co., Schenectady 5, N. Y.

■

New Switch Times Air, Hydraulic Cylinders

The Pneu-Trol time delay switch is said to provide accurate time control for cylinder-powered machine movements. It provides the wide range of control required for these applications, yet is compact and simple in operation, says the maker.

The switch can be attached to a wide variety of thrust linkages —for either downward, upward, or right or left horizontal thrust actuation. It provides controlled


"Wow! There's another J-M Built-Up Roof"
"It gives full protection from fire, rot and weather!"
"Right... and it's smooth-surfaced with no slag or gravel!"

Yes—it's a Flexstone* Roof

Each ply is a flexible covering of stone!

The secret of a Johns-Manville Flexstone Built-Up Roof is in the *felts*. They're made of fireproof, rotproof, weatherproof, enduring *asbestos*.

Flexstone Built-Up Roofs won't dry out from the sun . . . need no periodic coating. They're *smooth-surfaced*, too—permit thorough drainage, make any damage easy to locate and repair. They are engineered to each job . . . applied only by *J-M Approved Roofers*. J-M Asbestos felts are perforated to make application easier, give a smoother job, conform better to roof decks.

For your added protection, the Johns-Manville Asbestile* System of Flashing insures proper treatment of all critical areas. Asbestile is a heavy-bodied plastic cement designed for use with asbestos flashing felts to give thorough watertightness. As it sets, Asbestile becomes hard and forms an integral part of the wall itself.

To eliminate slag or gravel on dead-level or low-pitched roofs, Johns-Manville has developed a new smooth-surfaced asbestos roof called Flexstone *Special* Built-Up Roof.

Send for brochure BU-51A. Contains complete specifications for Flexstone Roofs and Asbestile Flashing System. Write Johns-Manville, Box 158, Dept. FM, New York 16, N. Y.

*Reg. U. S. Pat. Off.

Made of ASBESTOS

Johns-Manville FLEXSTONE Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS

DECORATIVE FLOORS • MOVABLE WALLS • ETC.

ARE YOUR ELECTRIC TRUCKS GUILTY OF
"4 O'clock Letdown?"
READY-POWER DRIVE
for Full Efficiency ALL THE TIME!
CONTINUOUS-DUTY POWER UNITS
The READY-POWER Co.
3820 Grand River Ave., Detroit 8, Michigan
Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

NEW ELECTRICAL EQUIPMENT

Begins on page 164

time dwell at positive stops on either end of the cylinder stroke.

You can get a Pneu-Trol switch to dwell in any 20 to 1 ratio from a minimum of ¼ second to a maximum of 60 seconds. Explosion-proof and vapor-sealed models are available. In all cases compact size permits obstruction-free mounting, maker says. Full story in company Bulletin.

Pneu-Trol Devices, Inc., 1438 N. Keating Ave., Chicago.

■

Single-Phase Vertical Hollowshaft Motors

New single-phase hollowshaft motors in the U.S. line have ratings of from 1½ to 5 hp. with speeds of 1800 and 3600 rpm. Main feature of the new line is the use of an accelerating type relay to disconnect the starting capacitors.

The new relay is said to be simpler and less critical than previously used centrifugal switches, yet it gives a fast, clean contact break, says the maker.

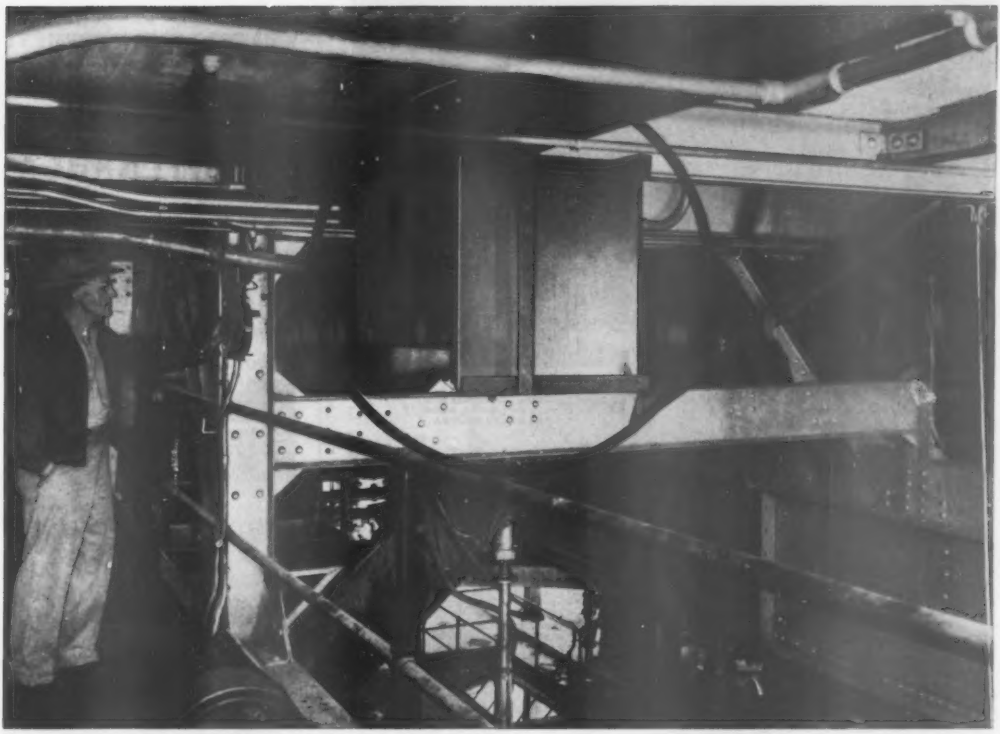
Other features of the new motor line are asbestos protection for the motors, Lubriflush lubrication, solid centricast rotor, downdraft ventilation, adjustable hollowshaft, and reverse protection clutch. Company bulletin describes the line in detail.

U. S. Electrical Motors Inc., 200 E. Slauson Ave., Los Angeles 54.

■

PHASE-SEQUENCE RELAY protects polyphase rotating machinery that might function improperly or be damaged by the application of reverse-phase sequence, extremely low voltage, or single-phase voltage. Unit will operate on either 2- or 3-phase a-c at all standard industrial voltages, says The Shepard Elevator Co., 5000 Brotherton Rd., Cincinnati 9, Ohio.

Turn the page



60-kvar capacitor unit shown above is part of the 600-kvar installation that permitted a 10% increase in load.

Capacitors can be put in out-of-the-way places—such as on these existing horizontal I-beams to conserve space.

Seriously overloaded circuits take on 10% more load after G-E Capacitors are added

American Crystal Sugar Co. profits from an emergency that arose during a recent sugar refining "campaign."

During a sugar beet "campaign" which lasts from July to December, the American Crystal Sugar Company of Clarksburg, California, operates 24 hours a day. Shutdowns mean costly financial losses.

That's why the company really had an emergency on its hands when its electrical facilities became seriously overloaded in a recent campaign. However, the solution was simple. A call to G.E. brought 600 kvar of capacitors to the plant in time to prevent a "burnout."

A short time after the order was placed, the capacitors were installed and in operation. The plant's power factor climbed from 86% to about 97%. This relieved the overloading—*and released enough capacity to handle a subsequent 10% increase in load!*

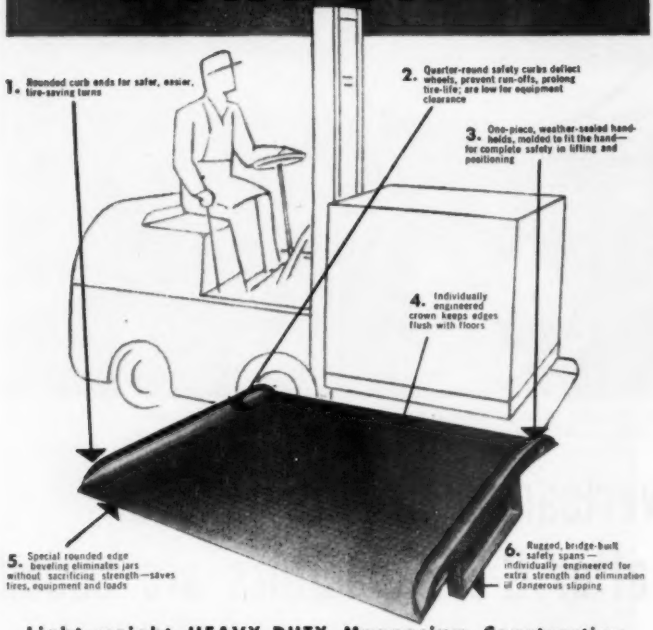
CAPACITORS HAVE MANY USES

They can often free distribution facilities to carry 20 to 30% more load. Where voltage drop is a problem, capacitors can provide the needed voltage boost inexpensively. And if your power factor is below 85%, and you have a power-factor or kva-demand clause in your contract, they can usually cut your power costs.

For more information, see your local G-E Apparatus sales office, or authorized G-E agent or distributor. Or write to Section 407-209 for booklet GEA-5632—"How to Reduce Power Costs and Gain System Capacity." *General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

You can SEE
6 Exclusive Money-Saver Features
in MAGCOA
light-weight HEAVY-DUTY
DOCKBOARDS


1. Rounded curb ends for safer, easier, tire-saving turns
2. Quarter-round safety curbs deflect wheels, prevent run-offs, prolong tire-life; are low for equipment clearance
3. One-piece, weather-sealed hand-holds, molded to fit the hand—for complete safety in lifting and positioning
4. Individually engineered crown keeps edges flush with floors
5. Special rounded edge beveling eliminates jars without sacrificing strength—saves tires, equipment and loads
6. Rugged, bridge-built safety spans—individually engineered for extra strength and elimination of dangerous slipping

Light-weight HEAVY-DUTY Magnesium Construction

(⅓ the weight of steel) with resulting increases in efficiency and safety . . . individually engineered for *your* requirements . . . long life that you can take for granted: these are the other money-saver features that make Magcoa Dockboards a *good* investment right from the start and your *best* investment in the long run.

Write today for literature showing why many leading companies *standardize* on Magcoa Dockboards for freight car and truck loading, how they benefit . . . and how you can, too. At the same time, ask for new literature showing how Magcoa's magnesium fabricating experience and facilities can help you improve your products through use of light-weight, heavy-duty magnesium. Use the handy coupon.

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MAGNESIUM COMPANY OF AMERICA, East Chicago 5, Ind.
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City_____ Zone____ State_____

Begins on page 148

MAINTENANCE TOOLS & SUPPLIES

Overhead Maintenance From the Floor

They probably call this device the Industrial Monkey because it makes a monkey out of high-bay relamping, and similar overhead maintenance. You mount the monkey boom and bucket platform on any 2-ton or heavier truck that has 102 inches of clearance between the rear of the cab and the center line of the rear axle.

The Monkey's platform is encircled by a protective cage. The operator uses six foot controls to bring the cage to any desired position, leaving his hands free and ready for work. Both controls and cage are micarta-insulated for 24,000-volt protection.

The boom has a 270-deg. swing, and a horizontal to vertical working span.

Donwill Co., 835 S. E. Main St., Portland 14, Ore.

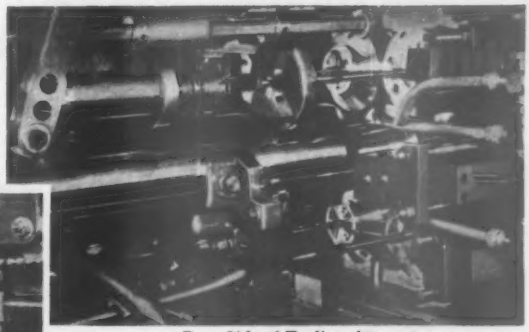
Turn the page

Although certain types of shaft jobs offer natural opportunity as bar machine work, with the exception of the CONOMATIC, seldom do they appear on multiple spindle bar automatics. In general, shaft jobs require a longer tooling area than do other types of bar work.

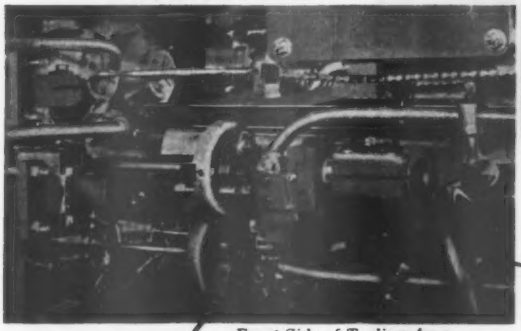
A glance at the frame design of the CONOMATIC explains why its tooling area is longer* than the tooling areas of other "automatics." And there are more tool positions* and more room* for tool setting for *any* type of job.

*You can have the figures

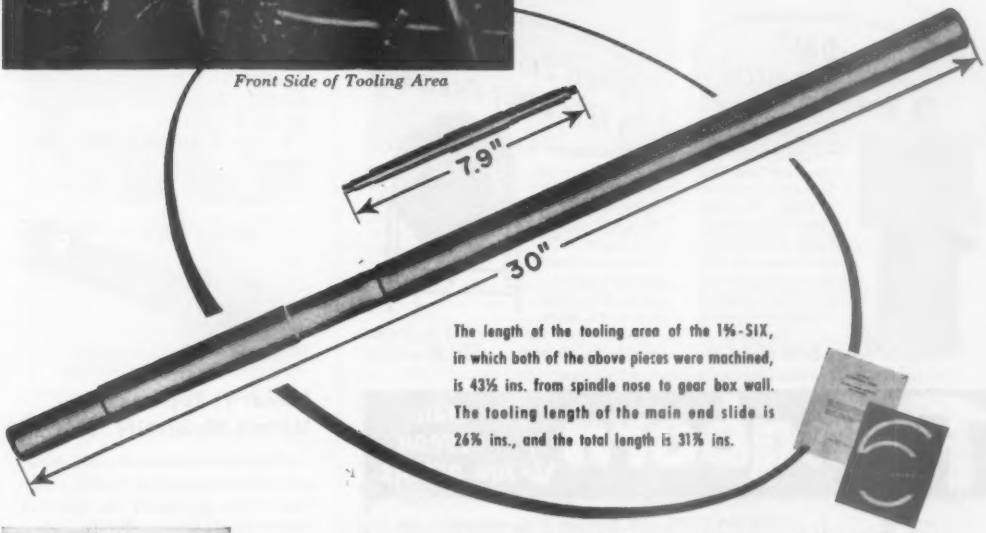
THERE'S *More* THAN JUST *"Elbow Room"*



Rear Side of Tooling Area



Front Side of Tooling Area



The length of the tooling area of the 1⅝-SIX, in which both of the above pieces were machined, is 43½ ins. from spindle nose to gear box wall. The tooling length of the main end slide is 26⅜ ins., and the total length is 31⅞ ins.

A Comparison of ALL Automatics is in favor of Cone

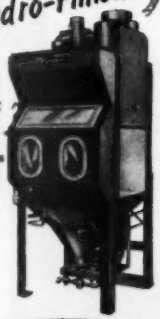
Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

NOW! Pangborn Stock Units for Blast Cleaning... Dust Control... Precision Finishing

Blast Clean with this Portable Unit!

Ideal for maintenance and many other jobs, including removal of rust, dirt, scale, etc. Economically cleans large objects like tanks, bridges, structural work before painting. Six sizes, stationary or portable, from . . . . **$170.00** and up.

Speed Polishing with Hydro-Finish!



Removes scale and directional grinding lines . . . prepares surfaces for plating and holds tolerances to .0001"! Liquid blast reduces costly hand cleaning and finishing of molds, dies, tools, etc. Models from **$1410.00** and up.

Stop Dust at the Source!

Pangborn industrial type Unit Dust Collectors trap dust at source. Machine wear is minimized, housekeeping and maintenance costs reduced. Solves many grinding and polishing nuisances and material losses. Models from **$286.00** and up.

Clean Small Work in this Blast Cabinet!

Ideal for producing smooth, clean surfaces on pieces up to 60" x 36" in size. Cleans metal parts, removes rust, scale, dirt, grime, paint, etc., in a few seconds. Saves money all year 'round. Models from . . **$319.00** and up.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn MAIL COUPON FOR DETAILS

Check for more information

- ☐ Blast Cleaning Cabinets
- ☐ Blast Cleaning Machines
- ☐ Unit Dust Collectors
- ☐ Hydro-Finish Cabinets

PANGBORN CORP., 2100 Pangborn Blvd., Hagerstown, Md.

Gentlemen: Please send me more information on the equipment I've checked on the left. To be used for_____

Name . . . . .

Company . . . . .

Address . . . . .

City . . . . . Zone . . . . State . . . . .

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 168

Hand Tool Miters Metal Strip

This hand tool is said to permit precise on-the-job mitering of metal strip. Maker says that its high leverage produces clean, accurate cuts with just a squeeze of the stainless steel handle.

The Metalmiter comes with a variety of dies—for burr-free mitering, notching, and slotting. It will handle non-hardened steel in thicknesses up to 1/32 inch, metals such as copper and aluminum in thicknesses up to 1/16 inch.

Snap-in feature makes dies quickly interchangeable. Tool weighs 2 pounds.

Lander & Abbott, La Crescenta, Calif.

■

Handrift Replaces Unsafe Makeshift "Drifts"

When set-up men and die-makers have to pound a finished surface that shouldn't be marred, they often use a drift. This drift is a piece of brass, lead, or some other soft metal that can be pounded with a hammer without marring the finished surface.

These make-shift drifts can be a hazard, because of flying metal

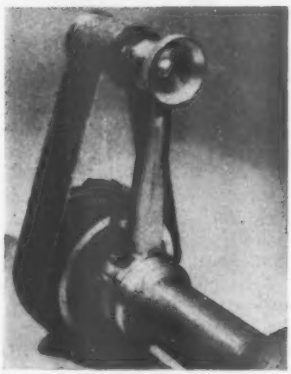
Begins on page 168

parts and missed blows; expensive, because of the limited useful life of a lead or babbitt drift; and inefficient.

To give the machinist something better to use, Custanite has developed the Flex-Flo Handrift shown in cut-away above. It's made of an alloy that won't chip, flake, or spark. And it compresses slightly under the impact of each stroke to prevent mushrooming of the hammer head. The rivet pin keeps the head from flying off.

The Custanite Corp., Box 66, Larchmont, N.Y.

■



Belt-Grinding Device for Portable Tools

Add another job to the many you can handle with your portable hand tools. Carborundum's new attachment permits the use of abrasive belts on straight spindle air and electric hand tools.

The unit is attached by a split bracket to the casing of the tool where grinding wheel guards are normally mounted.

The contact wheel of this device is a small-sized version of the serrated "61" wheel recently introduced by Carborundum. There are two models at present —one for 12x1-, the other for 20x2-in. belts. Recommended op-

This big Pangborn "CH" Collector, at Garden City Foundry, Stoughton, Wis., serves the foundry's grinding wheels and its Pangborn Blast Cleaning Machines. Result: Plant and equipment are protected from excess abrasive dusts, and employees work in a dust-free area!

GOT a DUST PROBLEM?

Here is the hood and piping system which conveys dust laden air to Pangborn Collectors at Middlesex Silver Co., Middletown, Conn. Valuable silver fines recovered with this system are worth $15,000 a year, after all operating costs of the system have been paid!

This one Pangborn installation solved six dust control problems for Kingsbury Machine Tool Co., Keene, N.H. Heating costs have been lowered substantially through recirculation of cleaned air, costly dust damage to machinery and products has been prevented, and workers' efficiency has increased!

THE THREE EXAMPLES you see here are actual case histories of dust problems solved by Pangborn Dust Control Equipment. In each case, Pangborn engineers studied the problem, recommended a solution, and worked closely with plant supervisory personnel in securing the greatest benefits possible from the dust control equipment.

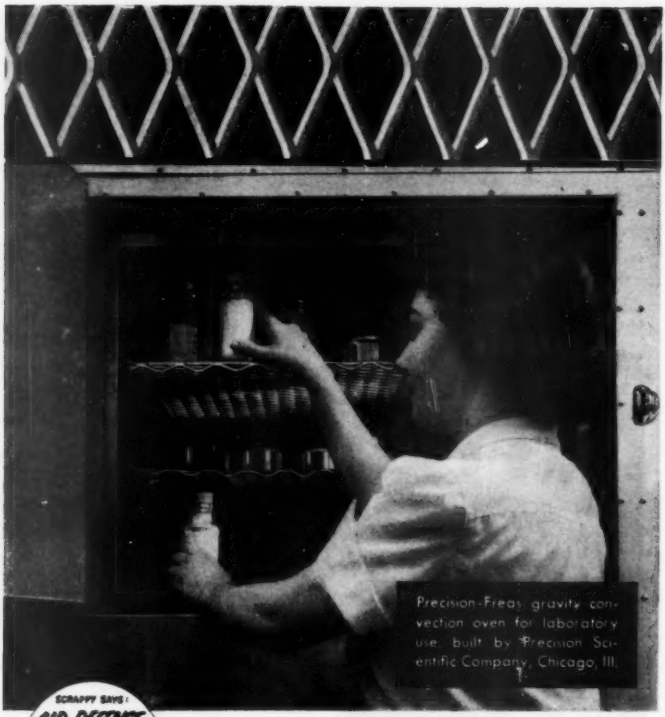
Not that these examples are unusual; they're typical of Pangborn's day-to-day operation. Improving working conditions, removing dust hazards, improving community relations, saving money through reclamation and salvage of the dust collected—these are Pangborn's stock-in-trade—these are the benefits literally thousands of plants are enjoying, thanks to Pangborn.

What are your Dust Problems? Find out what Pangborn can do to solve them. Write for Bulletin 909A. Address: PANGBORN CORP., 2100 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment

Pangborn DUST CONTROL

STOPS THE DUST HOG from stealing profits



SCRAPPY SAYS:
AID DEFENSE
MORE SCRAP TODAY...
MORE STEEL TOMORROW

SOLID STEEL shelves —that let Hot Air through!

• Distortion-free shelves of Wheeling Expanded Metal are ideal for high-temperature ovens. Not woven, not welded, but pierced and stretched from solid steel, ExM permits uniform distribution of heat... has no soldered joints to fuse... is easily removed. For strength *plus* free passage of heat, light, air... it's Wheeling ExM—*your material of 1001 uses!*

Wheeling

IT'S WHEELING EXPANDED METAL!

WHEELING CORRUGATING COMPANY
WHEELING, WEST VIRGINIA
Atlanta Boston Buffalo Chicago Columbus Detroit Kansas City
Louisville Minneapolis New Orleans New York Philadelphia Richmond St. Louis

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 168

erating speeds range from 5000 to 10,000 surface feet per minute.

The Carborundum Co., Niagara Falls, N. Y.

■

Portable Transfer Unit for Cleaning Oils

With this portable cart you can quickly clean hydraulic oils in your machine tools. It consists of a Yale & Towne pump with a 2-stage Cuno filter. The second stage filters out everything to 25 microns (about one-thousandth of an inch).

All tubing and Parker fittings are designed to JIC standards. The 1½-in. hose fittings permit quick assembly to the tank. Circulation rate is 10 gallons per minute.

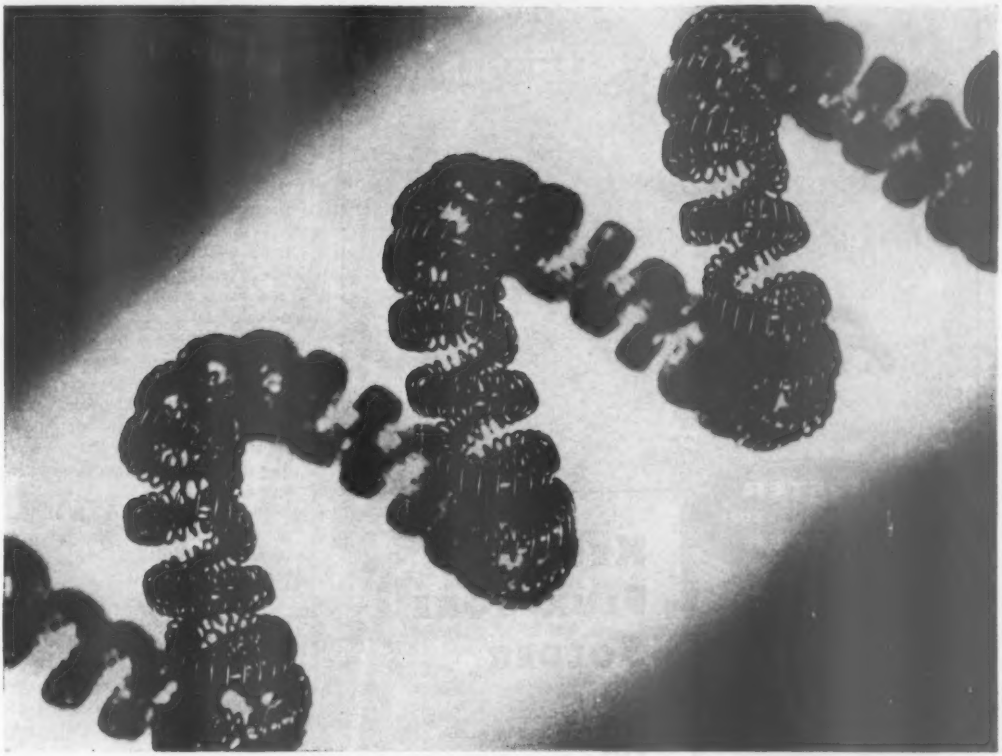
J. N. Fauver Co., Inc., 49 W. Hancock Ave., Detroit 1.

■

SYNTHETIC COLLOIDAL GRAPHITE —a dry lubricant—now comes in 12-oz. aerosol dispensers. The synthetic graphite is a slippery solid that resists extremes of temperature. Maker recommends it for green run-ins of new machines, for engine rebuilding where close tolerances exist, for conveyor belts exposed to high temperatures, for die casting, and for electrical appliance repairs. Reynolds Industries, Inc., 4500 Euclid Ave., Cleveland 3.

Turn the page

New G-E fluorescent lamp starts fast, needs no starter



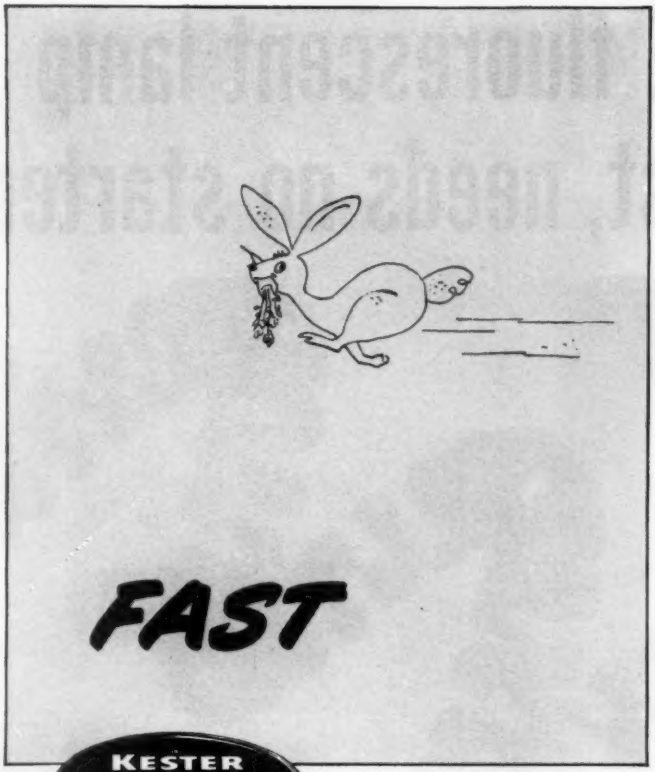
THE TRIPLE COIL filament developed by G.E., and shown greatly magnified above, now helps make possible another great new fluorescent lamp.

It's the *G-E Rapid Start* fluorescent lamp. Used with another new General Electric development, the *G-E Rapid Start* ballast, it starts almost instantly, gives smooth, simple operation. There's no starter needed, so maintenance is easier and more economical.

General Electric Rapid Start fluorescent lamps and ballasts will be available soon. These two newest developments of General Electric research are another reason why you can *expect* the best value from G-E fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC



KESTER FLUX-CORE SOLDER

FAST **In Soldering Action**
FAST **In Obtaining Wanted Results**

Kester can give you the exact percentage of flux content needed for your particular soldering operation. Only Kester has the proven ability to exercise this *flux control!*

Kester also has the greatest selection of Flux-Core Solders . . . Acid, "A", Nosput, Knorust, Plastic Rosin, "Resin-Five", "44" Resin and others in a wide range of diameters and impurity free alloys.

KESTER SOLDER COMPANY
4213 Wrightwood Ave., Chicago 39
Newark 5, New Jersey • Brantford, Canada

KESTER SOLDER

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 168

Drill Jack Simplifies Hand Drilling

Dril-Jak can put up to 2000 pounds pressure behind a portable hand drill. It can simplify hand drilling by:

- exerting extra pressure and increasing the speed of a drilling operation;
- permitting efficient drilling in overhead and other hard-to-get-at locations;
- eliminating the need for an extra helper in some tough drill jobs;
- minimizing operator fatigue.

Big use for Dril-Jak is on construction jobs, though it can be used successfully in many plant maintenance applications.

The Dril-Jak weighs 9½ pounds, is 34½ inches long over all, has a maximum lift of 30 inches. Maker says that with extension pipes and adapter you can reach up to 25 feet with it.

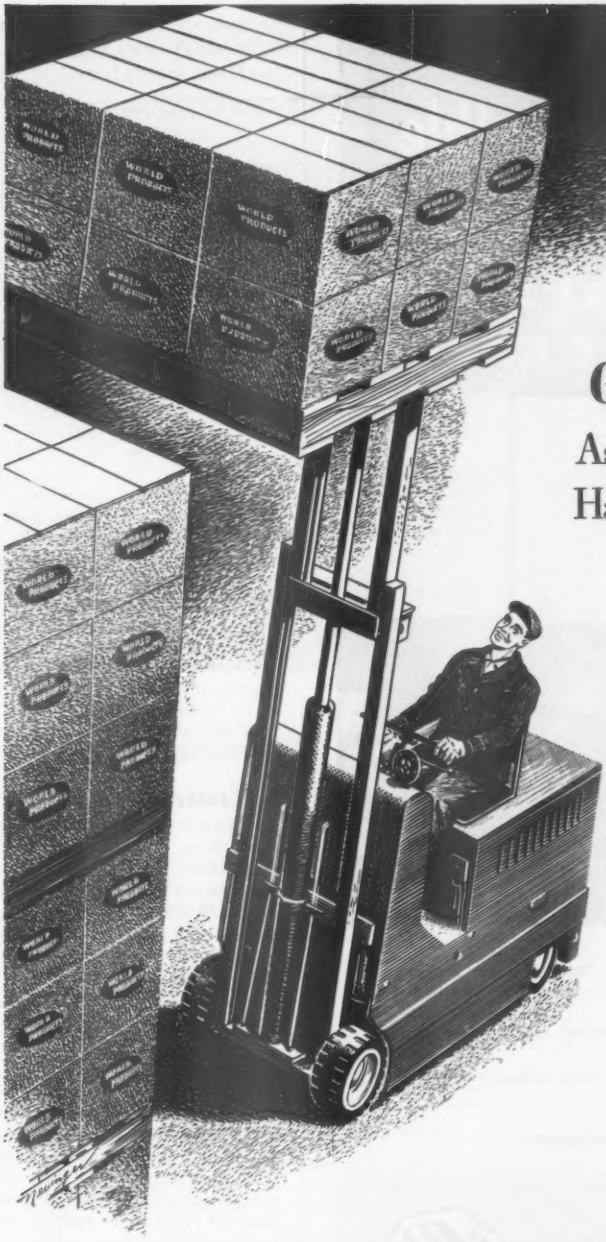
Clamp attachment fits any standard drill motor with ½-in. or larger drill capacity. Versatile jack can also be used in other maintenance jobs—lifting, temporary bracing, weld positioning, etc.

Time Saver Tool Co., Inc., 2103 St. Clair Ave., Cleveland 14.

■

SMALL ELECTROMAGNETIC CHUCKS bring the advantages of magnetic chucking to smaller machine tools. The three new chucks—in sizes 5x10, 6x12, and 6x18 inches—are made by Hanchett Magna-Lock Corp., Dept 130, Big Rapids, Mich.

Turn the page



GAYLORD BOXES

Assure Easier Warehouse Handling of Your Product

Built with exceedingly high compression strength, Gaylord Boxes eliminate "weaving" or "toppling" in storage and in transit.

That's just one more example of the economy of Gaylord controlled quality.

Your nearest Gaylord representative is ready to help you with your packaging problems. Get in touch with him.

It's the unseen quality that gives you the extra margin of safety in

Gaylord Boxes

GAYLORD CONTAINER CORPORATION

General Offices: SAINT LOUIS

CORRUGATED AND SOLID FIBRE BOXES • FOLDING CARTONS • KRAFT BAGS AND SACKS • KRAFT PAPER AND SPECIALTIES

New York • Chicago • San Francisco • Atlanta • New Orleans • Jersey City • Seattle • Indianapolis • Houston • Los Angeles • Oakland • Minneapolis • Detroit • Columbus
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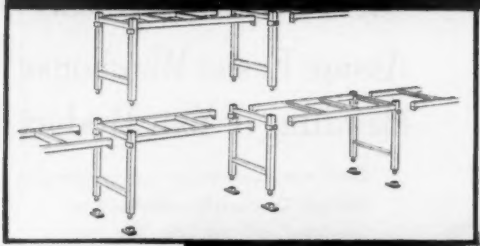
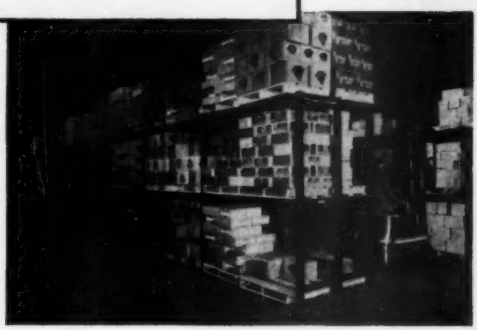
Milwaukee • Weslaco • New Haven • Amarillo • Appleton • Hickory • Greensboro • Sumter • Jackson • Miami • Omaha • Mobile • Philadelphia • Little Rock • Charlotte • Cleveland

Keep your Storage Area Flexible

with MHS COLLAPSIBLE PALLET RACKS



Method of assembling a bank of MHS Collapsible Pallet Storage Racks



MHS Collapsible Pallet Storage Racks in a warehouse

You can set up MHS Collapsible Pallet Storage Racks easily and quickly anywhere in the plant or warehouse. It takes only two men and they needn't be skilled.

You can add any number of units longitudinally and one or more tiers vertically at any time.

You can move these racks from place to place without damage. They never become obsolete.

Write for prices and specifications.

Mechanical Handling Systems, Inc.

4600 NANCY AVE. • DETROIT 12, MICH.

Offices in Principal Cities

In Canada: Canadian Mechanical Handling Systems, Ltd.

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 168

CLOG-PROOF SANDPAPER is on the market—and you'll wince when you hear how easily the trick has been turned. Instead of using ordinary paper backing, Bay State Abrasive Products Co., Westboro, Mass., has imbedded its abrasive particles in a tough open-mesh fabric. It lasts 10 times as long, says Bay State, since removed stock flows out through the mesh holes.

■

A COMPLETE LINE of sheetmetal clamps and applying tools are being made the Monogram Mfg. Co., Santa Monica, Calif. Clamps come in five basic styles to hold sheetmetal during fabrication in a wide range of riveting, welding, and machining operations. Each style has different sizes to accommodate thicknesses of from 3/16 to 1½ inches, fit holes from 0.096 to 0.350 inch.

■

PHOS-COPPER, a low-melting brazing alloy for copper and copper alloys, is now available in paste form from Westinghouse Electric Corp., Box 2278, Pittsburgh 30. Phos-Copper has high fluidity and good wetting properties, and is said to penetrate tight-fitting joints to form a strong, ductile bond. No flux needed in most copper applications.

■

NEW HAND TOOL for staking pressure wire terminals weighs only 40 ounces but can exert 4000 pounds on its installing dies. The compact unit operates on air pressures of from 75 to 150 psi. Interchangeable dies install bare or self-insulated Sta-Kon terminals on AN or AWG wires, #22 through #10. The Thomas & Betts Co., Inc., 36 Butler St., Elizabeth, N. J.

Turn the page

this "sleeve" gives valves a steady hand

For clock-like precision in up-and-down motion, valve tappets require smooth-as-glass guides—"sleeves" tailored to 5/10,000 of an inch for snug, exact fit. For such precision work with a variety of products, leading manufacturers depend on Lycoming's production skill and resourcefulness.

Whether you require precision machining, high-volume production, product development—or air-cooled power for aircraft or ground applications—look to Lycoming! Long famous for aircraft engines, Lycoming offers extensive facilities and well-rounded experience.

To function precisely, an aircraft engine valve needs steady tappets. For a "guide" to steer tappets true, **Pratt & Whitney Aircraft called on Lycoming for precision production.**

For a more complete story on Lycoming's varied activities and facilities, write—on your company letterhead—for the interestingly illustrated booklet "Let's Look at Lycoming."

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME-MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

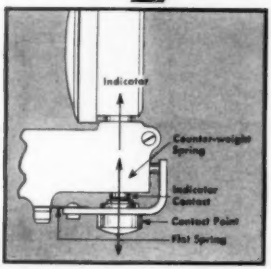
LOOK TO **LYCOMING** FOR RESEARCH FOR PRECISION PRODUCTION

LYCOMING-SPENCER DIVISION, WILLIAMSPORT, PA.
BRIDGEPORT-LYCOMING DIVISION, STRATFORD, CONN.

AVCO MANUFACTURING CORPORATION

Side Thrusts and Friction Don't Affect this SNAP GAGE

Because the Dial Indicator is free while measuring the dimension



UNAFFECTED BY SHOCKS AND FRICTION

The flat spring supporting the contact point takes all the shocks and side thrusts — the indicator contact point merely rides on the gage contact point. There is no tendency for the indicator spindle to bind. Counter-weight spring offsets weight of gage and of inspector's hand.

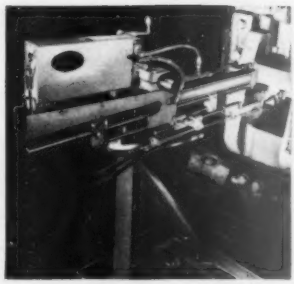
FEDERAL MODEL 1000 SERIES GAGES *show you the amount of error* so you can make corrective adjustments *before you begin to produce scrap.* Measurements are not influenced by "feel" and any operator obtains the same reading. These gages are fast, lightweight, and more accurate than conventional "go, no-go" gages.

Five gages enable you to inspect all dimensions from 0" to 6". Price, any one gage with .0005" grads. $57.50 . . . with .0001" grads. $75.00 . . . larger sizes special. There are no extra gage costs when size requirements change — Adjustments can be made easily with a screw driver! Write for folder on these modern gages. Federal Products Corporation, 1337 Eddy Street, Providence 1, Rhode Island.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES.

MATERIALS HANDLING



Automatic Unloader for Short Press Runs

You can wheel this portable unloader up to your small and medium-size presses and get the production advantages of automatic removal of small parts. It's of particular value for job shop work or short runs. You can keep this mobile unit in continuous service by moving it from one press to another.

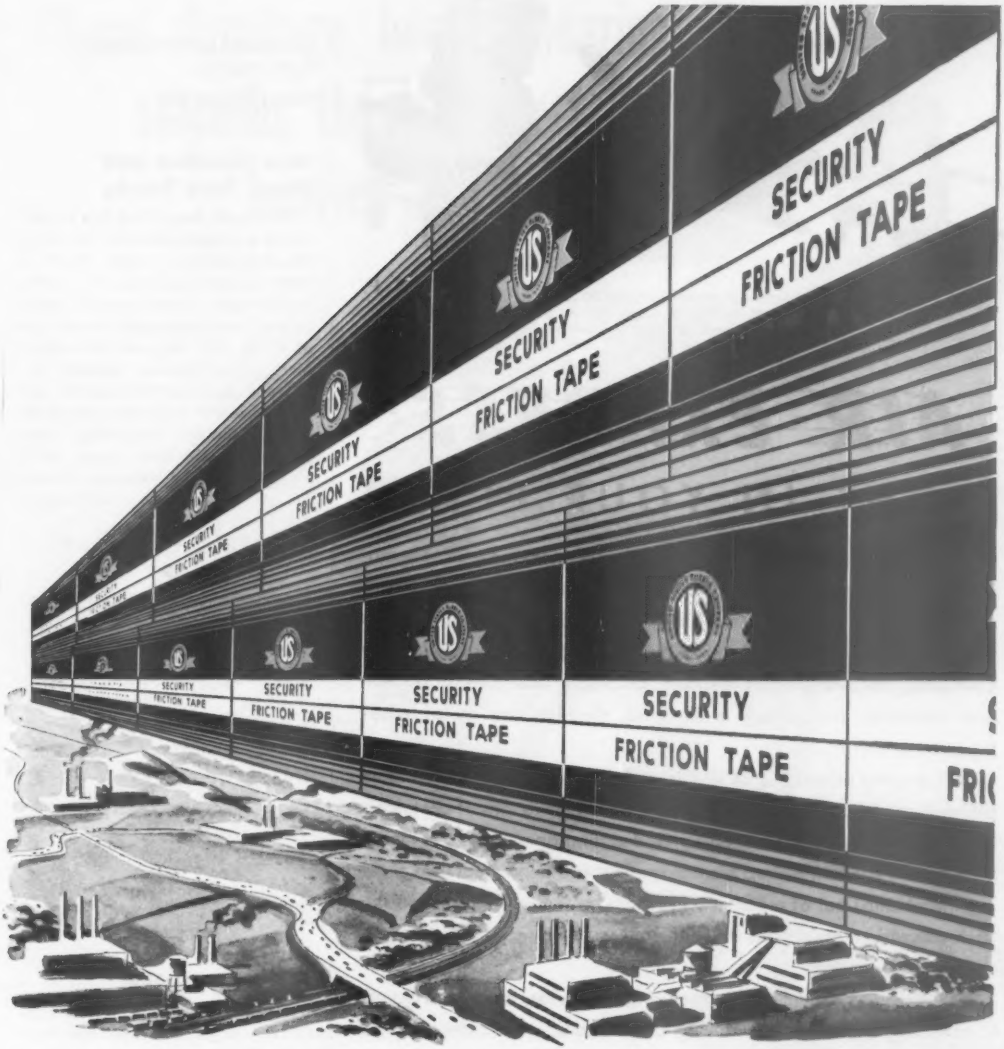
The unloader is equipped with a variety of interchangeable jaws, an air cylinder, and electric controls that synchronize unloading with the press cycle. You can adjust it to reach various die levels, and set it at any angle required. Jaws have straight-line travel and are suited for high-speed removal.

Sahlin Engineering Co., Birmingham, Mich.

■

UNUSUALLY LONG LOADS can be handled safely by fork extensions that fit over the standard forks of a Towmotor lift truck. Side flanges and lock prevent slippage of the forks when they are in place, says the Towmotor Corp., 1226 E. 152nd St., Cleveland 10.

Turn the page



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U.S. Security Friction Tape is a wall of safety—for both electrical and all-purpose jobs. A powerful grip... high-tensile and dielectric strength... no pinholes to cause dangerous leaks... straight-tearing, non-ravelling.

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1½ H. P.

A daytime production tool with 100 uses. At night, Spencer machines like these clean thousands of acres of industrial floor space.

7½ H. P.

AIR-EXPRESS

RIGHT IN YOUR PLANT

Industry has taken to the air to speed up the movement of raw materials and the tedious work of cleaning, inspection and packing of finished goods. It's the air of powerful vacuum—Spencer Vacuum which is being used daily for more than 100 startling applications for conveying, recovery, waste disposal, automatic dust-free production and sanitation, particularly in the food, chemical and metal industries.

It is moving mountains of rice from freight cars, hot fly ash from pits and sand from the bowels of ships. It is carrying tons of chemicals to the top of a plant for screening, and sorting operations by gravity with a final vacuum pickup from trays on the ground floor. It is picking metal chips out of machined products by the ton and recovering such valuable materials as babbitt, solder, gold, enamel dusts, mercury and solder flux.

For the more delicate manufacturing processes, Spencer Vacuum is speeding bench work, reducing dust conditions and cleaning the finished products. In food it's sanitation, vermin control and conveying.

Any kind of loose material can go "by air" the Spencer way. From heavy metals to loose powders and liquids of all kinds—it makes no difference to Spencer. But it makes a lot of difference to the men who formerly had to do these jobs by hand. More than 100 essential applications are included in Spencer Bulletin No. 144.

427-F

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

MATERIALS HANDLING EQUIPMENT

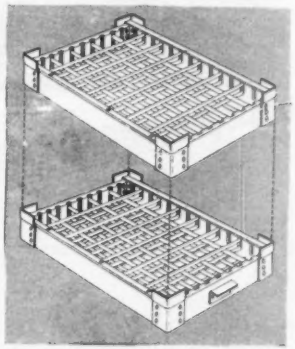
Begins on page 178

New Gasoline and Diesel Fork Trucks

Two new Buda fork lift trucks —one a gasoline model, the other diesel-powered — each have a 3000-lb. load capacity at a 15-in. load center. Trucks are available in five standard masts with lifts of 72, 84, 108, 114, and 120 inches. Mechanical features include: removable wet-sleeve cylinder liners for lower maintenance costs; quick-change industrial-type clutch; single-lever gear shift mounted on the steering column for ease of operation; and center point steering.

The Buda Co., Harvey, Ill.

■



Hardwood Box Handling System

The Wesling System offers simplicity, flexibility, and economy in handling production parts. Basic unit is a hardwood master tray with inside dimensions of 24x 13½ inches by 2⅜ inches deep. The bottom of this tray is composed of ½-in. hardwood dowels running the width on 1½-inch centers.

This dowel-bottom provides ample support for metal parts and plenty of opening for draining and passage of air. Slots in the ends and sides of the tray permit you to insert additional dowel rods to get an unlimited number

"Tycol Armitage boosts bearing life... smooths the way for faster, heavier loads"

Of course! Tycol Armitage Bearing Grease "stays put" ... keeps anti-friction bearings running smooth and cool. Its high stability makes it suitable for sealed anti-friction bearings that must last the life of the equipment.

Tycol Armitage possesses exceptional resistance to oxidation.

The dependable lubricating ability of this quality grease lengthens bearing life and cuts down maintenance costs.

Call your nearest Tide Water Associated office for further information.

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OUT OUR WAY
WATCH FOR TH' BLOWUP! THAT'S A BILL FOR AN OIL AND GREASE ABSORBENT, AND IT AIN'T SOL-SPEEDI-DRI!
BEFORE THE STORM
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First in value—
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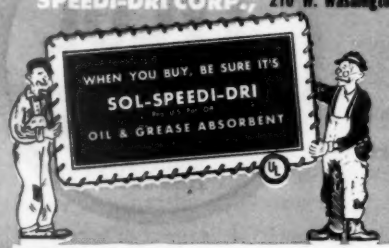
SOL·SPEEDI·DRI

Accept no substitutes! Pound for pound, dollar for dollar, SOL-SPEEDI-DRI gives you *more for your money*, all factors considered. That's why it's America's sales leader in the oil and grease absorbent field. Selected raw materials, careful processing, and laboratory controls keep quality always uniform. Send the coupon today for generous free sample and descriptive literature about how to "dry clean" *your* floors with SOL-SPEEDI-DRI.

SPEEDI-DRI CORP., 210 W. Washington Sq., Philadelphia 5, Pa.



Warehouse stocks maintained in principal cities of the United States and Canada.

• • •

Inquirers in New York, New England, and New Jersey should write to Speedi-Dri Corp. Elsewhere in U.S. to Waverly Petroleum Products Co., 1724 Chestnut St., Phila. 3, Pa.

FREE SAMPLE: Fill out the coupon and mail today for big, free sample and brochure.

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Address_____

City_____ State_____

FMM-7-52

MATERIALS HANDLING EQUIPMENT

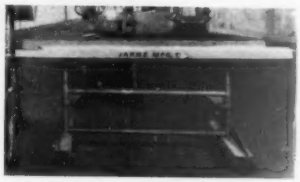
Begins on page 178

of space combinations. You can quickly set up a space pattern to handle and protect almost any size and shape of part.

Build-up sections—the same size and construction as the master unit but without a dowel bottom—can be added to form a deeper box if needed. These units stack safely into the metal corner guides of the box below. There's a peg tray, too, that you can use for handling bushings, gears, and similar small parts.

Albert Wesling & Sons, Inc., 2912 W. Lake St., Chicago 12.

■



Portable Press Feeder

Steelmobile speeds up the handling of steel sheet and bar stock that is fed into punch presses and similar machine tools. It's designed to bring material from storage to press at the proper work level.

This all-steel cart will handle a load of 2000 pounds. You can adjust the table height from 32 to 42 inches, and incline it to a maximum of 45 degrees.

Jarke Mfg. Co., 5407 N. Broadway, Chicago 40.

■

CRAWLER-TYPE FORK-LIFT called Terra-Lift will work both indoors and out on almost any type of terrain, claims the American Tractor Corp., Churubusco, Ind. It's got crawler tracks for all-weather outside operations, and rubber track shoes for work inside the plant. Available in load capacities up to 6000 pounds, with lifts up to 12 feet.

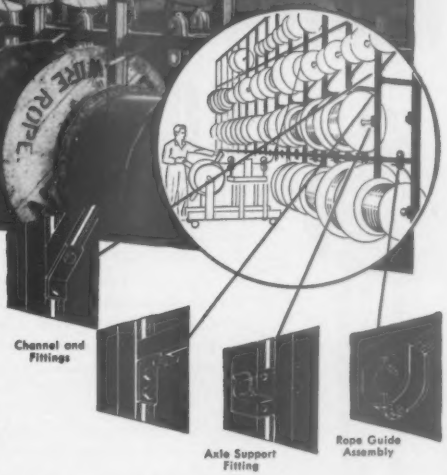
Turn the page

wire rope handling* *made easy* with UNISTRUT® reel racks

*Applies to racking wire and cable reels also.

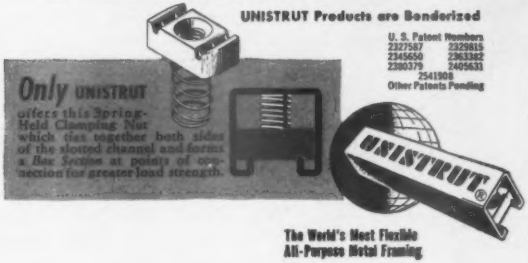
Measuring, coiling and cutting wire rope becomes easy one-man job for Wm. H. Ziegler Co., Inc., distributors of construction and industrial equipment, since the installation of the new UNISTRUT reel racks in their Minneapolis and Duluth warehouses.

View shows how each reel hangs independently to permit quick selection of any size rope without disturbing other reels. Keeps working area clear, utilizes all space to ceiling. With UNISTRUT framing there is no drilling, no welding, no special tools or equipment needed. Engineering is simplified—all you do is cut channel to size and bolt fittings in place. The UNISTRUT system is easy to work with, completely adjustable, provides great strength without bulk. Give it a trial in your business.



For Defense Production—Every day the value of UNISTRUT products is being proved by their use in Defense Industries and Armed Services installations where flexibility, and assembly and erection speed count most.

Representatives and Warehouse Stocks in Principal Cities—Consult Your Telephone Directories


Only UNISTRUT offers this Spring-Held Clamping Nut which ties together both sides of the slotted channel and forms a Box Section at points of connection for greater load strength.
UNISTRUT Products are Bonderized
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UNISTRUT®
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of 24-page, fully illustrated Catalog No. 600—Racks you can build with UNISTRUT metal framing. Includes full description of 46 different kinds of UNISTRUT racks, drawings and complete ordering information.

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Please send the items checked below, without obligation:
☐ Rack Catalog No. 600 ☐ UNISTRUT Sample
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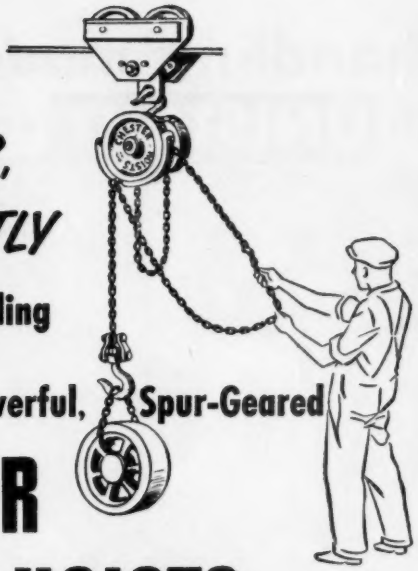
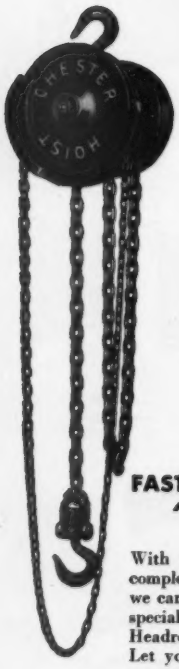
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____



EASIER,
LESS COSTLY
Material Handling
...with Powerful, Spur-Geared
CHESTER
HOISTS



Chester Spur-Geared Chain Hoists are expertly designed and ruggedly built . . . to give you rapid lifting and lowering with the least effort and lowest cost. Made in sizes from ¼ to 25 tons—and built into a number of special-purpose hoists such as Extended Handwheel and Low Headroom. Timken Bearings reduce friction on working parts, insure smooth operation and long life. Chester Differential Hoists are also available—in ¼, ½, 1 and 1½-ton sizes. Ask your distributor, or write us, for complete catalog, and tell us your requirements.

CHESTER HOIST DIVISION
The National Screw & Mfg. Company
Lisbon, Ohio

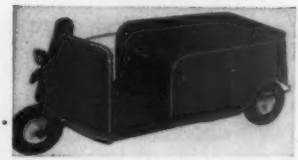
FAST SERVICE ON *"Specials"*

With a modern, compact, completely integrated plant, we can give fast service on special types such as Low Headroom Trolley Hoists. Let your distributor quote on your specifications, or write us direct.

National FASTENERS HODELL CHAINS CHESTER HOISTS

MATERIALS HANDLING EQUIPMENT

Begins on page 178



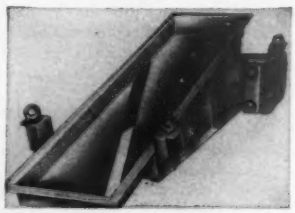
Electric Auto Buggy for In-Plant Travel

This electric buggy is a silent, efficient means of transportation for small but important parts and parcels—and for plant superintendents and executives, too. The Autoette Pick-Up is powered by a 24-volt battery.

It's got a speed of 12 mph., a payload space of 28x35 inches, 11 inches deep. Over-all length is 92 inches, width 38 inches, height 38 inches. Weight without batteries is 425 pounds; maximum payload is 500 pounds.

Blood Sales Co., Autoette Div., 545 W. Anaheim St., Long Beach 13, Calif.

■



Vibrating Feeder With Diagonal Discharge

Vibrating spreader feeder made by Syntron provides a continuous curtain of fine bulk materials. The flat-pan spreader trough is powered by a single electromagnet drive.

Discharge slot in the trough is diagonal to the line of material flow. This provides a discharge stream two to four times wider than the original stream of material.

Syntron Co., 480 Lexington Ave., Homer City, Pa.

Turn the page

THESE 3 NON-METALLIC DISCS can save you hundreds of valve dollars

Lunkenheimer "N-M-D" (Non-Metallic-Disc) Valves save you maintenance time and replacement money. Each disc is compounded for a special service — and all are easily interchanged or replaced. You're sure of the *right* valve for the job when you stock Lunkenheimer "N-M-D's."

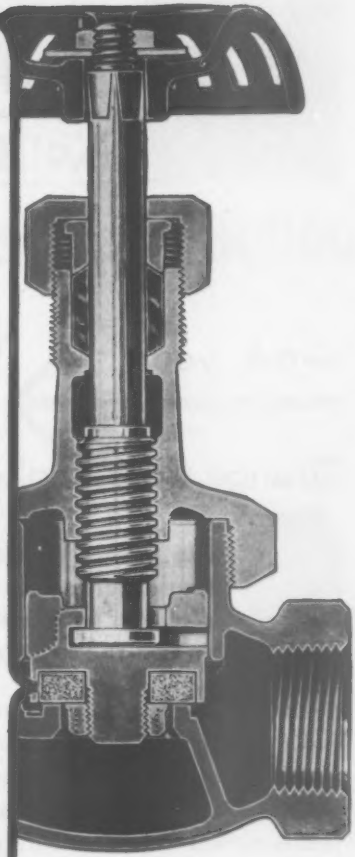
LUNKENHEIMER "N-M-D" Valves with No. 20 Discs handle 150 lb. saturated steam and hot water at pressures up to 300 lbs. and temperatures to 150°F. No. 20 Discs are designed for use on all Lunkenheimer "N-M-D" Globe, Angle, Check, and Quick Operating Valves where hot fluids are handled.

★

LUNKENHEIMER "N-M-D" Valves with No. 30 Discs are recommended especially for cold water, air, and gas service at pressures to 300 lbs. All Lunkenheimer "N-M-D" Valves can be converted from one service to another simply by exchanging the discs, which are identical in size and shape.

★

LUNKENHEIMER "N-M-D" Valves with No. 50 Discs are ideal for gasoline, oil, butane, and propane service. Disc-Holder for all "N-M-D" Valves is the slip-on type—four long guides prevent "cocking" and assure perfect disc seating. All three discs can be replaced or exchanged quickly.



WRITE FOR Circular 558, which includes complete details, dimensions, and service recommendations. It is available from your distributor or from The Lunkenheimer Co., Box 360L, Cincinnati 14, Ohio.

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L-112-4

LUNKENHEIMER

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When you have a taping problem

—ask your Orange Core dealer

Your Orange Core Gummed Tape dealer is an expert on the sealing of cartons and parcels; his help to you is free.

"Service" is the first name of your Orange Core Gummed Tape dealer. He can give you the counsel you need—not only on the sealing of cartons and parcels—but on many paper problems in general. If he doesn't have the facts you want, he'll get them for you. Good will is the foundation of his business success.

Service is his yardstick for the paper lines he sells, too—lines that give you *more service* for the money. Typical is Orange Core gummed sealing tape. This brand is unexcelled by any other standard tape for uniformity and dependability—because it is made from tree to finished product under *one* roof. As a bonus it offers you the exclusive Hudson feature—*Supple-izing**—preventing tendency to stiffness and curl.

Service is prompt with your Orange Core dealer. Patronize him for *all* your paper needs.

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"The world's largest selling gummed tape"

ORANGE CORE

GUMMED SEALING TAPE

Available plain or printed, in choice of widths, weights, lengths, and colors

HUDSON PULP & PAPER CORP., Dept. 410, 505 Park Ave., New York 22

WHAT'S NEW IN EQUIPMENT

Begins on page 148

MEASURING & CONTROL APPARATUS

Meter Control Assembly You Can Mount Yourself

Assembly Products has been selling contact meters together with the necessary components to enable customers to make their own controls. Now they are putting out a ready-made assembly, pre-wired and tested for the same purpose.

U-Mount-It consists of a contact meter and control chassis. The single- and double-contact meters indicate and control voltage, current, or temperature. The contact settings are adjustable over the full-scale arc.

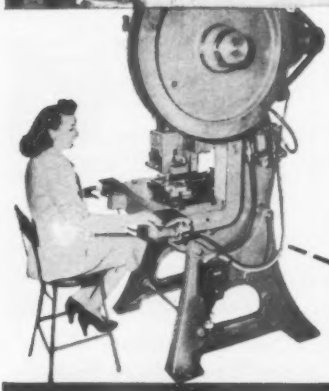
The control chassis includes a transformer, rectifier power supply, and all the necessary relays for a complete control, with contact rating of 15 amperes 115 volts non-inductive. Hinged brackets enable you to mount the control inside equipment or behind panel boards. Full details in company bulletin SP-78.

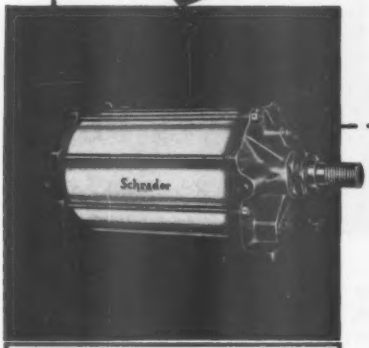
Assembly Products Inc., Main at Bell St., Chagrin Falls, Ohio.

■

PYROMETERS—in three sizes and nine standard ranges—cover a temperature span of −200 to 3000 F. They come in clear plastic cases with black dial faces showing both Fahrenheit and Centigrade readings. All are designed for semi-flush mounting in panels of non-magnetic material. Sensitivity is 4 ohms per millivolt. Assembly Products Inc., Main at Bell St., Chagrin Falls, Ohio.

Turn the page





Some equipment just naturally boosts production

. . . Schrader Air Controls for instance. *You can't help* getting smoother, faster operations with air power on your side.

The tireless muscles of compressed air lighten labor all along the production line.

● *For ejection of work,* Schrader Air Ejection Sets automatically eject finished parts . . . eliminate tedious hand removal or bulky mechanical devices

● *On power presses,* press brakes, and any machine using either a friction or mechanical clutch, Schrader Machine Controls promote building a high-speed work rhythm that pays big production dividends with safety.

● *All over the shop,* Schrader Air Cylinders are faithfully on the job, delivering more powerful straight-line forces than any other commonly used power units of equivalent size or weight.

These are only three of the many hundreds of new and improved Schrader Air Control Products that build production and safety in your plant. It's easy to get complete details. Write, outlining your present or projected use of power machinery—or fill out the coupon below.

Schrader
REG. U. S. PAT. OFF.

products control the air

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

Mail This Coupon Today

A. SCHRADER'S SON
Division of Scovill Manufacturing Company, Incorporated
457 Vanderbilt Avenue, Brooklyn 17, N. Y., Dept. N-7

I am interested in more information on.....

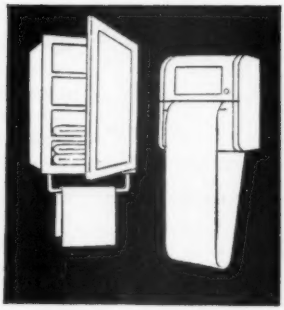
Name_____ Title_____

Company_____

Address_____

COBWEBS IN THE THINK TANK?

Go wash your face!



COTTON TOWEL SERVICE

No investment required. Get complete service on a low-cost basis. Under "Towel Supply Service" or "Linen Supply Service" in the telephone book, you'll find your suppliers—call them today!

Call it weariness, mental fatigue . . . or just the time of day . . . when you find yourself floundering on the job and want to wake up—GO WASH YOUR FACE. You'll be surprised how quickly your tired muscles and jangled nerves respond to soap and water and a rub with a fresh, absorbent cotton towel.

You can rub and rub to your heart's content—even with a heavy beard, cotton towels will not shed or leave a trail of residue on your skin.

WHAT PICKS YOU UP, PICKS UP YOUR EMPLOYEES. When you provide clean cotton towels, workers get added benefits from their rest periods. Watch efficiency, production, and morale climb when "Cotton Fresh-Up" is on the job.

Linen Supply Association of America
and NATIONAL COTTON COUNCIL
22 WEST MONROE STREET, CHICAGO 3, ILLINOIS

Begins on page 148

PLANT HOUSEKEEPING & SANITATION

Converts Industrial Vac for Heavy Duty Pick-Up

Add-A-Tank converts any regular industrial vacuum cleaner for heavy-volume pickup. With it you can add a standard ash-can to the suction line of your cleaner to collect the dirt pick-up. There's no danger of clogging your vacuum tank or filters, getting ashes in the vacuum motor, or burning the vacuum hose with hot clinkers.

The Add-A-Tank kit includes an ash can cover plate assembly, metal hose, extension pipes, flexible flue tool and scraper, and a wire brush.

The Add-A-Tank setup is ideal for cleaning furnaces and boilers. It's good for either wet or dry pick-up too. And you can use it in hazardous locations without danger of explosion. Only the ash-can assembly need be in the danger area. When you want continuous operation, you can quickly change ash cans without interrupting work.

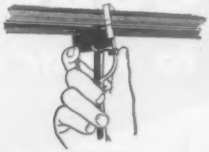
Multi-Clean Products, Inc., 2281 Ford Parkway, St. Paul, Minn.

Turn the page

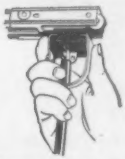
Lighting where and when you need it ... without rewiring!

Safe. Sturdy. Current-carrying Trol-E-Duct bus bars are totally enclosed. Duct itself (arrow) supports fixtures. Continuous slot in bottom of duct means you can move lights (or small portable tools on trolleys) anywhere, any time without rewiring. *It's every inch an outlet!*

Quickly installed. Sections go up in a hurry, join without bolting. Sections are prefabricated, standardized in lengths of from 1 to 10 feet. Entire duct can be dismantled and reinstalled easily without a scrapped part.



Convenient. Lighting twist-out plugs slip into duct without cutting off power or upsetting production schedules. Plugs ground on steel casing before contacts touch bus bars, slide in with simple twist anywhere along duct.



Mobile Trolleys. Smooth-rolling trolleys are available to carry small, portable power tools, speed up production. Trolleys ride inside duct on metal wheels. Constant spring pressure against bus bars assures perfect contact.

BullDog Universal Trol-E-Duct lets you add, remove or rearrange lights quickly. No loss of man-hours, money, material.

When it comes to moving lighting fixtures, costs usually skyrocket. Not so with BullDog Universal Trol-E-Duct.

For here is a *truly mobile, fully flexible* lighting system at its money-saving best.

Every inch of Trol-E-Duct is a potential tap-off for lights or small power tools. To move lights or add new ones when you change machine layout, just slip twist-out plugs or trolleys in or out of continuous slot in bottom of duct. Duct itself supports lighting fixtures.

That's all. No rewiring needed. No production lost through shutdowns. No wasted man-hours or scrapped material, either, as with fixed outlet systems.

Trol-E-Duct is prefabricated, standardized and salvable. Installs in a hurry. Can be dismantled and reinstalled without loss.

Get all the facts on this modern, low-cost lighting system that fits present needs . . . provides for future needs, as well. Contact a nearby BullDog Field Engineer. He'll show you an installation in your area that will speak for itself. Or, for descriptive bulletin, write BullDog direct, won't you?

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO
PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

BULLDOG

SERVING INDUSTRY FOR 50 YEARS WITH FINER ELECTRICAL PRODUCTS

a new FIRST in concrete floors

GUARANTEED to wear as specified!

only DYNAPAKT CONCRETE FLOORS

OFFER ALL THESE ADVANTAGES FOR NEW FLOORS OR TOPPING

- Rocks of greatest strengths
- Matrix of highest density throughout the entire depth
- Installation by skilled crews using especially developed power-driven equipment
- Ready to use in 24 hours
- A performance bond if required

The DYNAPAKT system assures the user every benefit to be derived from the highest strength floor ever to be installed.

GET COMPLETE FACTS . . . WRITE TODAY FOR ILLUSTRATED, 20 PAGE BROCHURE: "TRAFFIC CONCRETE . . . A STUDY IN SPECIALIZATION."

FLASH-STONE COMPANY
INCORPORATED
3733 PULASKI AVENUE, PHILADELPHIA 40, PA.
Specialists in Industrial Floor Installations . . . Nationally

PLANT HOUSEKEEPING & SANITATION

Begins on page 188

Tractor-Sweeper Combination

The general-purpose sweeper shown up front in this picture is specially designed for the International Cub tractor. The brush is hydraulically raised and lowered, and is rotated from the rear power take-off of the tractor.

Brush is made of Palmyra stalk which is refillable. It's 25 inches in diameter, 72 inches long, provides a 60-in. sweeping path. You can easily remove the dust hood for snow sweeping.

Meili-Blumberg Corp., New Holstein, Wis.

■

WET-DRY VACUUM CLEANER made by Finnell Systems, Inc., Elkhart, Ind., has separate air streams for vacuum pick-up and motor cooling—thus protecting motor from pick-up grounds. The Model 10B weighs 53 pounds, moves on ball bearing swivel casters. Capacity is 12 gallons wet, 1½ bushels dry. Machine is powered by 1 hp. motor. Accessories include all standard attachments.

■

PAINT, PLASTER, AND COLOR in one operation. That's what you can do with Paint-O-Plast, an interior coating developed by Enterprise Paint Mfg. Co., Dept. PH-7, 2845 S. Ashland Ave., Chicago 8. Paint-O-Plast will cover just about any surface. But it's specially recommended for problem walls where you want to hide nail holes, cracks, and seams. Full story in company bulletin.

Turn the page

Panel discussions on how casters help reduce the **"Reducible 30%"***

MATERIALS-HANDLING FORUM

Write us how you've used casters to solve specific handling problems. $25.00 will be paid for material used.

A SERIES PUBLISHED BY BASSICK, WORLD'S LARGEST MANUFACTURER OF CASTERS AND FLOOR PROTECTION EQUIPMENT

CASTER LOAD CAPACITIES DEPENDENT ON FLOOR AND OPERATING CONDITIONS

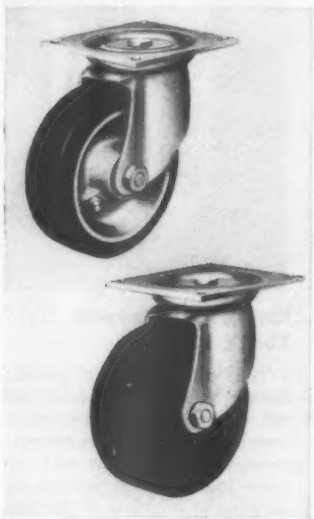
Speed of Travel, Condition or Type of Operating Surface, Manual or Power Operation Important Factors

All these variable factors must be taken into consideration when ordering casters from the load capacity data given in caster catalogs.

It should be understood that such data can only be an approximation. Casters of similar size and type are rated differently by different manufacturers. Bassick, with a reputation to maintain as world's largest caster maker, protects its customers by making its ratings conservative. However, the best protection from the dangers of overloading is to be thoroughly familiar with the following facts.

SOFT RUBBER-TREAD WHEELS HAVE LIMITS

Don't expect a rubber-tread wheel to carry the same load as a metal or hard-tread composition wheel of equal size. Figure the rubber-tread wheel will carry about 50% as much.



For example, Bassick's popular, high-quality, double-ball race, swivel caster No. H6991-2 (bottom) is load-rated at 650 lbs. with a 6 in. x 2 in. semi-steel wheel. The same caster, when supplied with a 6 in. x 2 in. aluminum core *rubber-tread* wheel, No. H6993R-2 (top), is load-rated at 350 lbs.

Too often someone will replace metal wheels with rubber treads and complain that the equipment is hard to move. Rubber-tread wheels protect floors, but will not give the same ease of rolling as a hard wheel of equal size.

FAST TRAVEL CUTS CARRYING CAPACITY

The caster shown above, No. H10931-2, a 10 in. heavy-duty model, will carry a static load of over 80,000 lbs., but nowhere near that load in action. Hence, this precision Bassick "machine tool of motion" is rated at 10,000 lbs. It's ideal for heavy units on production lines, and moving or positioning heavy machinery. It is not designed for speed.

POWER-PULLED TRAILERS HAVE SPECIAL CASTER NEEDS

The caster just discussed would not stand the strain of serving on a power-pulled trailer where speeds may reach 5-10 miles an hour. A specially-designed caster is needed—like this No. 10TS1-2, Bassick's 10 in. trailer type swivel number, load-rated at 2,000 lbs.

Consider floor surface in determining load

Don't worry too much about overloads if floors are fairly smooth and travel areas free from obstacles. In such a case, the No. H6991-2 would carry 750 lbs. very satisfactorily, though rated for 650 lbs. But if operating conditions are rough, use casters and wheels rated above the maximum loads anticipated. A wheel large enough to easily ride over obstacles should be selected. The larger the wheel, the easier the equipment will roll.

Full details available on request

Write for Catalog 124A for load capacities of Bassick Casters and Wheels. Satisfied users mean more to us than immediate orders. That's why our ratings are conservative—based on tested average normal operating conditions. Bassick Casters are sold by carefully-selected, local industrial supply distributors. THE BASSICK COMPANY, Bridgeport 2, Conn. *In Canada:* Belleville, Ont.

*According to cost analysts, materials-handling (about 30% of total cost) affords about the only real opportunities for cost reduction today.

Bassick — A DIVISION OF STEWART SW WARNER

MAKING MORE KINDS OF CASTERS... MAKING CASTERS DO MORE

HEWITT-ROBINS

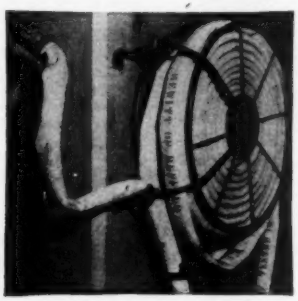
FOR FASTER, SAFER WELDING

Use Hewitt-Robins Twin-Weld—
2 Hoses Molded on 1 Line

Speeds Welding: In patented Twin-Weld®, both a **green** oxygen and red acetylene line are molded in one compact, flexible, easy-to-handle unit. Ideal for use in close-quarter work.

Stops Tangling: Eliminates dangerous tangle of two separate hoses—won't kink—makes welding jobs safer.

Get The Whole Story: Call your Hewitt Rubber Distributor (see classified phone book) or write for Bulletin H-4.



FIRST FOR FIGHTING FIRES

Hewitt-Robins Fire Hose—
Unexcelled For Over 80 Years

For the finest fire hose money can buy, **always specify Hewitt-Robins Maltese Cross®, Monarch® (Underwriters specification) . . . or Ajax® Mill (General Service). They are unequalled for service, quality and safety.**

Whatever your requirements for fire hose, you will find that Hewitt-Robins has the right hose to meet your needs . . . cotton-jacketed—rubber-covered chemical booster . . . each one is *first* in its class.

For complete fire hose facts: Call your Hewitt-Robins Distributor (see "Rubber Products" in classified phone book), or write for Bulletin H-2.

HEWITT-ROBINS HR **INCORPORATED**
STAMFORD CONNECTICUT

Hewitt Rubber Division
Hewitt Restfoam® Division
Robins Conveyors Division
Robins Engineers Division

SAFETY & PLANT PROTECTION

Emergency Shower That's Portable

You can spot this portable shower at points of remote hazard, or wherever physical conditions do not permit permanently installed showers. The unit provides instantaneous wetting and washing of all parts of the body and clothing of persons exposed to fire, acids, or radiological contamination.

You can quickly set the unit up wherever a water supply is available. Valve for turning on the water is operated by a swinging gate that is activated by the slightest pressure of any part of the body.

Logan Emergency Showers, Inc., P. O. Box 111, Glendale, Calif.

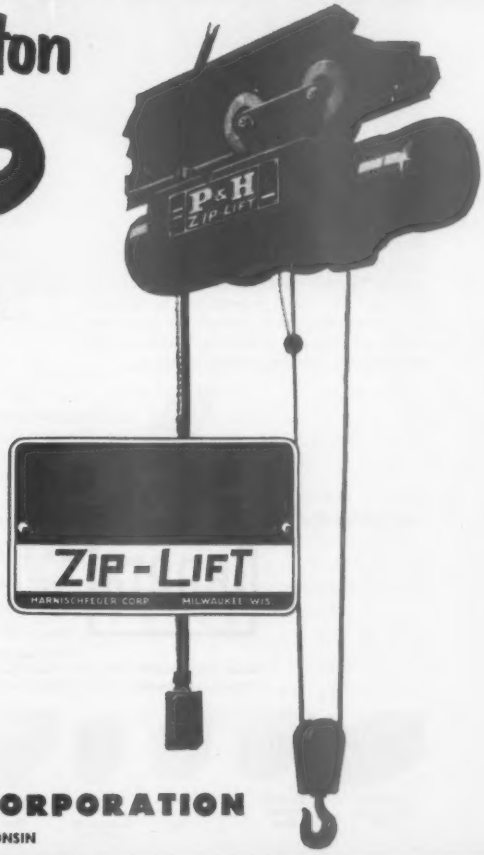
Turn the page

Heave-Ho by Push-button with a ZIP

handle it "thru-the-air"—faster for less

Do you still have places in your plant where skilled hands wrestle with heavy loads? That's tough on workers! Expensive, too! Consider the savings a Zip-Lift will bring you. One man can press buttons to handle loads up to 2,000 lbs. — faster, without effort — and at far less cost.

There are reasons aplenty why the Zip-Lift is America's fastest selling wire rope electric hoist. It has all the quality features that make it more usable, more dependable — and absolutely safe. Hang it up on a hook, jib, or trolley — beside machine tools, along assembly lines, around loading docks, receiving rooms, warehouses. The Zip will pay for itself over and over — and over again!



CALL YOUR ZIP-LIFT DEALER

or write for Bulletin

HARNISCHFEGER CORPORATION

4525 WEST NATIONAL AVENUE • MILWAUKEE 46, WISCONSIN

your competition may be MORE than one jump ahead if you make these products: kitchen ranges • water heaters • regulators • refrigerator units • pumps • motors

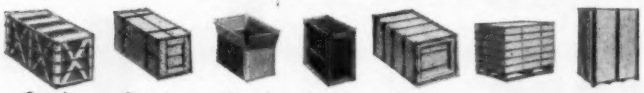
Our packaging engineers have just designed new and different containers for *each* of these products. They are lightweight and extra strong! They are *designed* to cut packing and shipping costs, to speed production! They are good looking, too! We have experience in designing better shipping containers for practically all types of products. Write us. Get the facts on this important subject.

Get this important booklet. Write today! It's free! It shows how to cut packing and shipping costs.

ALL TYPES OF ENGINEERED SHIPPING CONTAINERS

General BOX COMPANY
1807 Miner Street,
Des Plaines, Ill.

District Offices and Plants:
Cincinnati, Denville, N. J., Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, Sheboygan, Winchendon, General Box Company of Mississippi, Meridian, Miss., Continental Box Company, Inc., Houston, Dallas



General Wirebound Crate | General Nailed Box | General Corrugated Box | General Cleated Corrugated Container | General All-Round Box | Generalift Pallet and Pallet Box | General Watkins-Type Box

WHAT'S NEW IN EQUIPMENT

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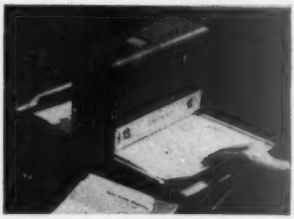
MISCELLANEOUS



Low-Cost, Portable Microfilming Camera

With its new portable camera Diebold claims you can have the benefits of micro-filming on the budget of a medium-sized plant. The compact camera plus a portable companion reader costs less than $1000.

The new Flofilm camera will microfilm just about any type of copy. Its film cartridge holds 50 feet of 16 mm. film—enough to copy 1600 letter-size forms. Centrally located processing centers develop your film, says Diebold.

Diebold, Inc., Flofilm Div., Norwalk, Conn.

■

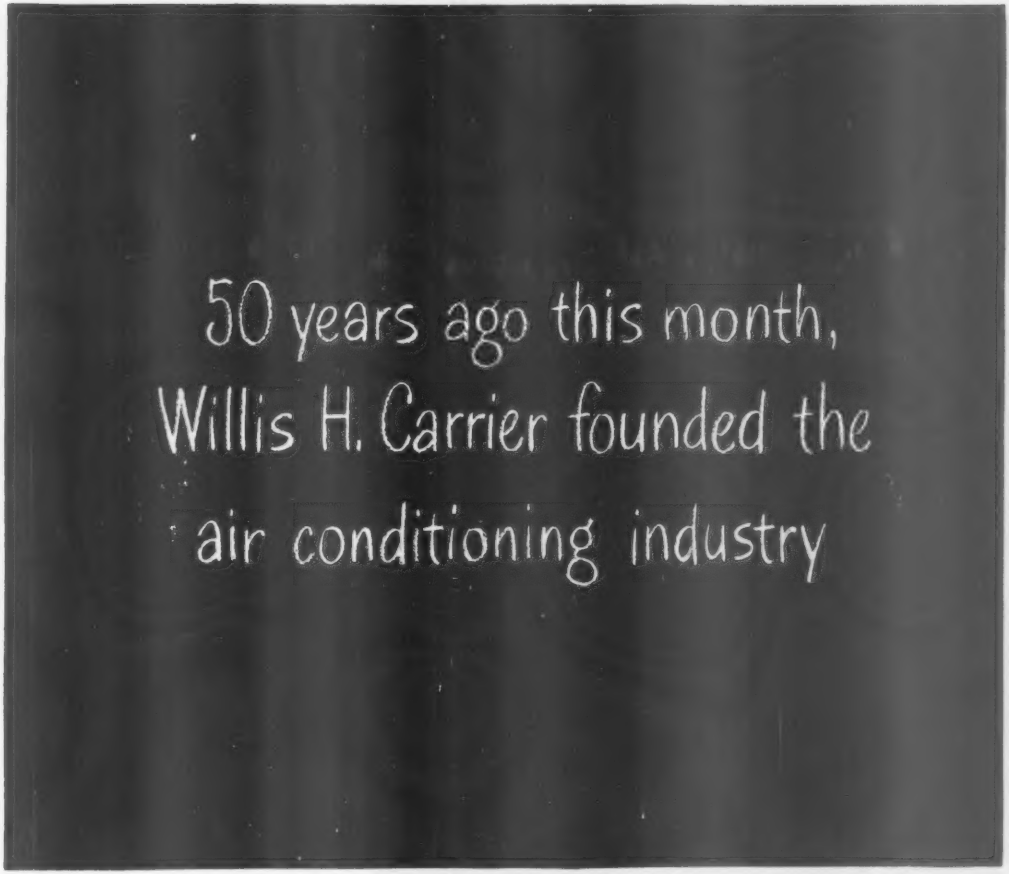
Spot Heating With a Radiant Mat

Workers in unheated or refrigerated parts of your plant will appreciate a new rubber floor mat that has a built-in radiant heating unit. You can put this mat to good use in the cabs of large overhead cranes, under the feet of machine tool operators, on exposed loading ramps, or near plant entrances.

The heater, says the maker, looks like a high-grade rubber floor mat. But in the center there's a layer of electrically conductive rubber that forms the heating element.

United States Rubber Co., Rockefeller Center, New York 20.

Turn the page



A printer in Brooklyn was having his troubles. Moisture content of the air was making his paper swell and shrink. But nobody could do anything about that . . . or could they?

Willis Carrier, then a young engineer with Buffalo Forge Company, thought he could. He designed a system that controlled the temperature and relative humidity in that print shop, winter and summer. This was the pioneer air conditioning installation.

Dr. Carrier and his associates formed the company which today leads the industry. And Carrier Corporation has virtually written the history of air conditioning. Carrier created the machines, opened the markets, blazed the trails.

That you are kept comfortable by air conditioning in bus, plane and train . . . restaurant, store and theater . . . office, factory and home . . . is due to the pioneering of this one company.

But Carrier has made even more important *indirect* contributions to your well-being. For air conditioning is also a production tool that is essential to the manufacture of synthetic fabrics, radar and electronic equipment, pharmaceuticals, precision aircraft parts, optical instruments, photographic film and scores of other products.

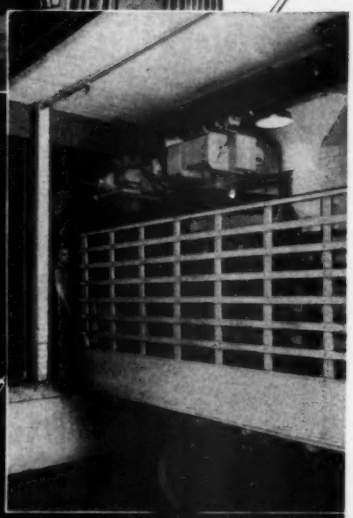
Air conditioning is an important part of your life today. But tomorrow it will be more important. For this industry of ours is very young. And its field of service is unlimited.

Carrier

AIR CONDITIONING • REFRIGERATION

for 50 years—the people who know air conditioning best

Two hoists connected with an American Mono-Tractor make up the special carrier for finger-tip transfer of heavy load.



Finger-Tip Handling
Speeds Delivery
TO
GraybaR
CUSTOMERS

Carrier runs on shielded RailMaster track over loading dock.

From warehouse stock to delivery truck, heavy loads are quickly transferred by finger-tip control with this American MonoRail Overhead Handling System.

In addition to speeding up loading and unloading time, this simple inexpensive system cut handling labor, improved space utilization, reduced material damage, and bettered working conditions.

It can be done in your plant and an American MonoRail engineer will gladly tell you how.

THE AMERICAN MONORAIL COMPANY

13114 ATHENS AVENUE • CLEVELAND 7, OHIO

MISCELLANEOUS EQUIPMENT

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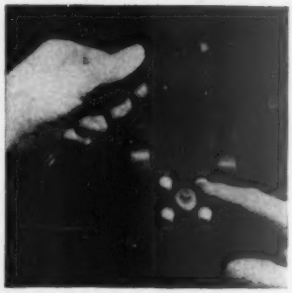


Telephone Dictation for Plant Executives

PhonAudograph brings low-cost dictation service to plant executives who don't need a stenographer full time. It's actually telephone dictation. You telephone your messages and correspondence to a central recording unit. One girl tends this central recorder, typing up each transcribing disc as it is completed. As many as 20 phones can be connected to one transcriber.

The phone sets used with PhonAudograph are special units. But The Gray people claim that any one who can use a standard telephone can easily use their units for dictation. The four pushbutton controls on the phone set permit you to:

- Dictate.
- Listen back when you want to pick up your trend of thought.
- Indicate corrections and the end of a message.
- Contact the central secretary directly.

The Gray Mfg. Co., Inc., 60 Eleventh Ave., N.E., Minneapolis.

■

PRECISION MINIATURE SWITCHES that will open and close as many as 100 million times have been announced by the Micro Switch Division of Minneapolis-Honeywell Regulator Co., Freeport, Ill. A new stainless steel alloy gives these miniatures their long life, high corrosion resistance.

Turn the page

Only B. F. Goodrich makes the grommet belts that cut costs 20 to 50%!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V Belts BY

B.F.Goodrich

FIRST IN RUBBER

The B. F. Goodrich Company
Dept. FM-7
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

Street Address_____

City_____

State_____

Why skilled workmen Choose RIDGID PIPE VISES

8 sizes for pipe from ⅛" to 6"

It's extra easy to work with RIDGID Bench Yoke Vises

★ All have handy integral pipe rests and benders.

★ Yokes and bases of strong special malleable; top quality tool-steel jaws—LonGrip jaws up to 6" capacity.

★ Made in bench, post, kit, stand and tristand models. Chain vises in bench, post, stand and tristand models.

★ Buy work-saver RIDGID vises at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

RIDGID
Work-Saver Pipe Tools

MISCELLANEOUS EQUIPMENT

Begins on page 194

Low-Temperature Pipe Insulation

Fiberglas dual - temperature pipe insulation is designed to give maximum efficiency to pipe lines operating at low temperatures, or at alternate cycles of high and low temperatures.

The insulation is made of fibrous glass bonded with a thermosetting binder. It's accurately pre-formed in easy-to-apply semi-cylinders that fit all standard pipe and tubing sizes. A vapor barrier is provided by factory-applied laminations of asphalted kraft paper and aluminum foil attached to the outside of the cylinder.

Once the insulation segments are placed around the pipe, the outside ashpalted laminations are sealed with a vapor barrier adhesive. End lap joints between sections are then sealed with 4-in. strips of vapor-barrier paper.

The insulation, says Owens-Corning, cuts down refrigeration costs, since little heat is gained by the insulated pipes. And since the dual temperature insulation prevents condensation, the drip-free area below these pipes then becomes usable storage space.

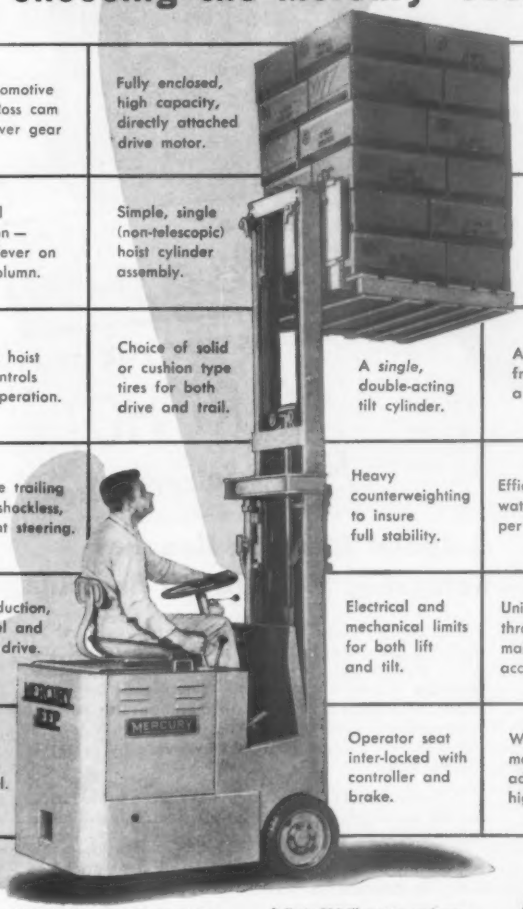
You can use this Fiberglas insulation on pipe temperatures from sub-zero to 25 F. If pipes must be run outdoors, an extra 35-lb roofing felt jacket must be added on top of the vapor barrier. All about the uses of dual-temperature insulation in company bulletin.

Owens-Corning Fiberglas Corp., 16 E. 56th St., New York.

Turn the page

*25 Good reasons
for choosing the Mercury "Jeep"

130" fork elevation with standard 83" collapsed height.	Inclined automotive steer with Ross cam and twin lever gear	Fully enclosed, high capacity, directly attached drive motor.		"Picture-frame" visibility — unobstructed operator vision.
59½" of free lift with standard 83" collapsed height.	Foot pedal acceleration — reversing lever on steering column.	Simple, single (non-telescopic) hoist cylinder assembly.		Hydraulic overload protection.
60" turning radius — right angle stack in 8' aisle with 32" load.	Convenient hoist and tilt controls for easy operation.	Choice of solid or cushion type tires for both drive and trail.	A *single*, double-acting tilt cylinder.	All-welded unit frame assembly — a Mercury "first."
Full floating drive — tapered roller bearing mounted wheels.	Castor type trailing axle with shockless, center point steering.		Heavy counterweighting to insure full stability.	Efficient — *lowest* watts per ton miles per hour performance.
Mercury *patented* cross-suspension of lifting carriage.	Double reduction, spiral bevel and spur gear drive.		Electrical and mechanical limits for both lift and tilt.	Unit assembly throughout–maximum maintenance accessibility.
Low pressure hydraulic system — efficient, leak proof.	Magnetic contactor travel control.		Operator seat inter-locked with controller and brake.	Wide tread for maximum stability — advantageous in high tiering.



Each of the MERCURY features listed above answers a specific problem... in installation... mechanical efficiency ... and ease and safety of operation. Together they support the impressive record the "Jeep" is establishing in industry every day... for efficiency and cost cutting performances. Before you commit for any fork truck... get the complete story on the MERCURY "Jeep."

MERCURY
FORK TRUCKS · TRACTORS · TRAILERS

MERCURY MANUFACTURING CO. 4110 So. Halsted St., Chicago 9, Illinois

Bulletin-295 illustrates and completely describes the many outstanding features of the MERCURY "Jeep." Request your copy.

MERCURY MANUFACTURING COMPANY
4110 So. Halsted St., Chicago 9, Illinois

☐ Have a representative call.

☐ Send copy of Bulletin-295 illustrating and describing the MERCURY "Jeep."

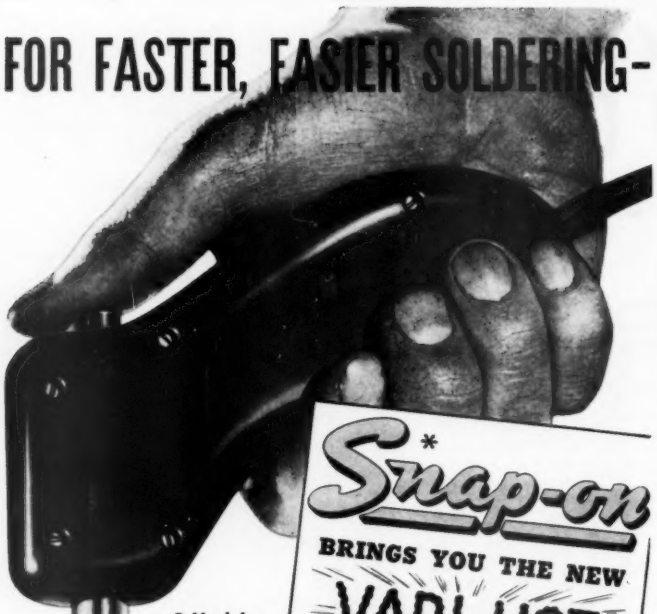
Name_____

Company_____

Address_____

City_____ Zone____ State_____

FOR FASTER, EASIER SOLDERING-



*Snap-on

BRINGS YOU THE NEW

VARI-HOT

Electric Soldering Iron

2 Models
$7.75
Each

2-Speed Element Reaches Soldering Heat In 40 Seconds

This 110-115 volt AC-DC iron goes to work FAST! Pressing the button shoots a booster charge of 100 watts within the tip—brings it to soldering temperature in just 40 seconds! Then, only 25 watts maintain normal tip temperature comparable to conventional irons drawing 100 watts. For heavy soldering jobs full current is always available by pressing the button.

A 28-32 volt AC-DC model is available for aviation use off the airplane power supply, it draws 3.6 amps in high heat and 0.9 amp in idling heat.

The Vari-Hot iron is *light*... only 10 ounces—a boon in continuous soldering operations! Adjustable rest on shaft permits laying iron down with no danger of burning surfaces or starting a fire. Shockproof Durez handle. Tapered chisel type tip plated with "Vanderloy" provides extreme durability to tip. Other type interchangeable tips are available. Write for literature and catalogs.

*Snap-on is the trademark of Snap-on Tools Corporation

SNAP-ON TOOLS CORPORATION

8044-G 28th Avenue, Kenosha, Wis.

MISCELLANEOUS EQUIPMENT

Begins on page 194

Electrically-Heated Valves

Electrically - heated Okadee valves keep frost and ice out of liquid carbon dioxide lines at temperatures as low as —110 F. These heated valves are also designed for service in other types of hot, cold, viscous liquid, and gas lines.

The single- and double-disc valves use either one or both of the heating elements indicated in the photo above. These elements heat the entire flow opening as well as the valve mechanism.

You can get these heated valves in sizes from 2 to 6 inches. You have a choice of pneumatic, hydraulic, solenoid, or manual control. Heaters operate on either 110 or 220 volts, with inputs ranging from 400 to 3000 watts. Heated valves for use in hazardous atmospheres will soon be available.

Okadee Co., 332 S. Michigan Ave., Chicago 4.

■

2-Way Radio Equipment

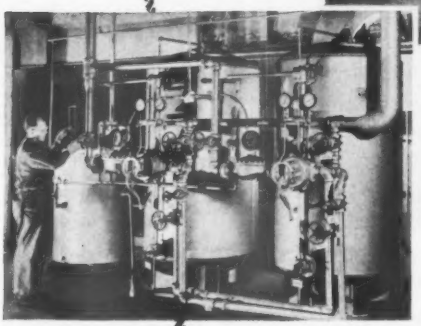
If overcrowded channels have kept you from getting a 2-way radio permit, Motorola may have the answer for you in its new line of radio communications equipment operating in the 450-470 mc. band. These new transmitters and receivers are designed for use in field cars, industrial trucks, and general in-plant use. Mobile units operate on 6 or 12 volts d.c.

Motorola, Inc., 4545 Augusta Blvd., Chicago 51.

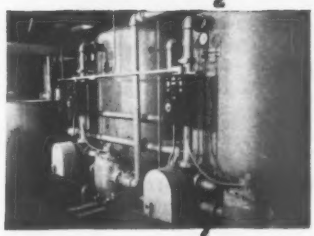
Turn the page

FOR WATER *that Fits Your Needs*

This hot process lime-soda softener for treating makeup to high-pressure boilers is rated at 5000 gph.



Sodium zeolite water conditioning equipment with capacity of 130 gpm provides boiler makeup to evaporator in an eastern utility power plant.



Dual automatic sodium zeolite water softener rated at 225 gpm is used in power plant of a Texas hospital.

TO ASSURE YOU water conditioned to your specific requirements, A-C engineers can draw on years of experience treating all types of water . . . plus a broad background of building turbines and processing equipment that are dependent on properly treated water. A-C water conditioning service includes:

Chemicals — for external and internal boiler water treatment . . . designed for silica removal and control of scale, corrosion and carryover. Also cooling cycle treatments . . . and dependable reagent chemicals.

Equipment — hot and cold process softeners . . . sodium and hydrogen zeolite softeners . . . alkalinity-reducing ion exchangers . . . deionizers . . . degasifiers . . . deaerating heaters . . . chemical feeding equipment . . . pumps . . . oil removal and water filters.

Comprehensive consultant service — surveys, reports . . . chemical and X-ray analysis . . . special studies.

WRITE FOR THESE BULLETINS

28X7636 — Meaning, Application and Measurement of pH

28X7559 — Hot Process — Hot Zeolite System

28B6611 — Hot Process Softener

28B7107 — Sodium Zeolite Softener

28X7808 — Alkalinity-Reducing Ion Exchanger

ALLIS-CHALMERS

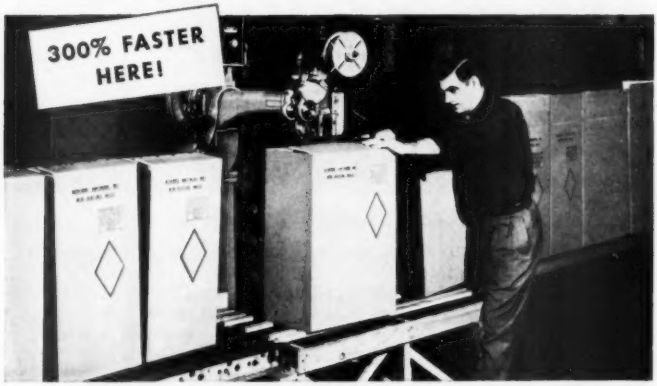
A-3761D

Milwaukee 1, Wisconsin

1. Bottoms sealed 80% faster than with tape, reports this novelty manufacturer. He now bottoms his cartons at the start of his conveyor system with a Bostitch bottom-stitcher, which makes its own staples from wire. Girls rapidly fill those cartons as they speed along the conveyor.

One production line...2 big savings

with Bostitch wire-stitchers at both ends of the line



2. One man does the work of three at the other end of the same conveyor . . . with a Bostitch top-stitcher replacing tape. This novelty maker also says that his staples cost him only ⅓ as much as tape per carton . . . his cartons are much stronger and neater . . . his workers happier.

How much time and money can you save in your shipping room? It's easy to find out. 300 BOSTITCH field men in 112 cities in the U. S. and 11 cities in Canada offer you nearby service. Illustrated bulletin shows you how 30 of the 800 Bostitch models . . . wire-stitchers, stapling machines, hammers, pliers, tackers, staplers . . . do your fastening jobs better and faster. Mail the coupon below today.

BOSTITCH, 416 Mechanic Street, Westerly, R. I.

Please rush me Bulletin 267 which shows how 30 Bostitch stapling machines save time and money in many vital shipping room jobs.

I'm particularly interested in Bostitch machines for: assembling cartons ☐ top-sealing ☐ bottoming ☐ sealing corrugated wrappers ☐ repairing cartons for re-use ☐ bag-sealing ☐ covering barrels ☐ tagging ☐ Other _____

Name ..... *Title* .....

Company .....

Address .....

City ..... *Zone* ..... *State* .....

BOSTITCH® fastens it better, *AND FASTER* with wire

MISCELLANEOUS EQUIPMENT

Begins on page 194

BARRIER ROPE made of polyethylene is ideal for marking off restricted areas around chemical operations. It has excellent resistance to acids, alkalis, mildew, and rot, according the Plymouth Cordage Co., Plymouth, Mass. It comes in ¼-in. diameter in five plain colors and various color combinations.

■

TO SIMPLIFY REPRODUCTION PROBLEMS, the Eastman Kodak Co., Rochester 4, N. Y., has published a special chart. The chart lists all the common types of originals, then indicates the print-making equipment and Kodagraph materials that will successfully reproduce each type.

■

ELECTRONIC STOPWATCH made by Potter Instrument Co., Inc., 115 Cutter Mill Rd., Great Neck, N.Y., splits a second into 8-million countable parts. It's really not a watch, but an electronic instrument for highly precise timing. Results are indicated on readout lamps to an accuracy of an eighth of a microsecond.

■

MANUAL HEAT SEALER for bags made of kraft-backed and scrim-backed laminates will make a vapor- and moisture-proof seal even at splices and overlaps. The unit make tight seals with a "once over" forward operation. You can operate it at a speed of 30 fpm. Pack-Rite Machines, 407 E. Michigan St., Milwaukee, Wis.

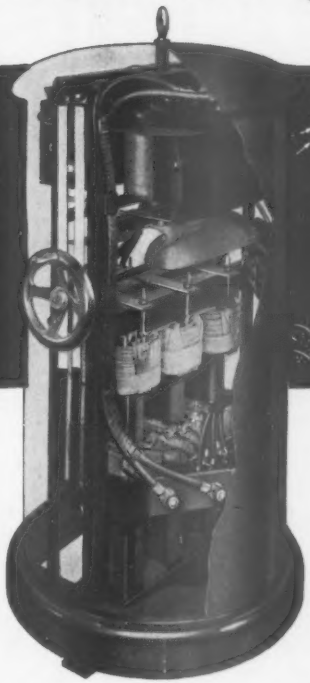
■

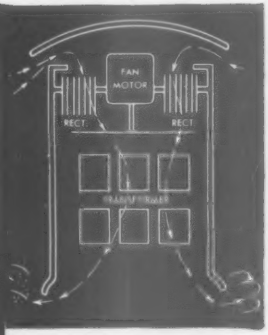
ONE-PIECE FIBERGLAS TANKS are being molded by the Laminex Corp., 994 Jefferson St., Fall River, Mass. Tanks are said to be sturdily constructed, non-corrosive, non-conductive to static electricity, and extremely light-

Turn to page 339

The only rectifier welder designed to eliminate stack failure!

A.O.SMITH D.C. WELDER





Location of rectifier stacks in the flow of cool, clean air entering the top of the A. O. Smith D.C. Welder assures positive cooling of these most critical parts.

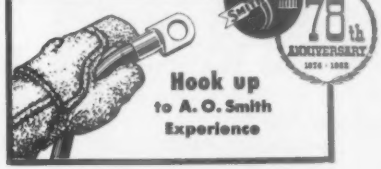
Wind tunnel design, proved for more than a decade in A. O. Smith Heavy Duty Welders, blasts cool air down and over rectifier stacks. This prevents stack failure. In addition, clean rectifier stacks and clean glass-insulated heavy copper transformer coils are assured. Maintenance down-time is thus avoided.

This marked advance over conventional rectifier-type welders solves overheating problems, ends limitations on duty, avoids introduction of floor dirt and eliminates rectifier stack failure.

Other refinements provide effortless amperage control, universal application and economical operation. They, too, are exclusive in this advanced design, rectifier-type, D.C. Welder.

Sectional view of the new A. O. Smith Rectifier-type D.C. Welder and diagramatic drawing show ideal location of stacks and circulation of high-velocity air through the welder.

Available in 200-, 300-, and 400-amp. models.



A.O.Smith
WELDING PRODUCTS

Made by Welders . . . for Welders

For complete information, write direct to: **A. O. Smith Corporation, Welding Products Division, Dept. FM-752, Milwaukee 1, Wisconsin**

d-c power in 2 minutes with an

Practically instantaneous starting is one of the many advantages you get by using the I-T-E Mechanical Rectifier. This source of low-cost d-c power in the 50 to 400 volt range can be on the line, operating at full load, within 2 minutes of the time the starting button is pushed. Even less time is required if the rectifier is not used in parallel with other types of d-c sources.

There are only 5 quick steps to starting—4 to stopping the equipment. These are easily performed by unskilled labor.

I-T-E Mechanical Rectifiers have no large rotating masses which must be brought up to speed before going on the line. No warm-up period is required—no waiting for vacuum build-up. This means the I-T-E Mechanical Rectifier has maximum availability for your process.

For further information, write I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pennsylvania. Ask for Bulletin 5106.

The 10,000 ampere mechanism pictured will supply d-c power to a chlorine cell line.

INSTALLATION IS FAST, TOO!

A complete installation can be unloaded, installed and placed in operation in a relatively short time. This is possible because of:

- Packaged delivery.
- Factory-wired and labeled control circuits.
- Truck-mounted, movable rectifying units.
- Overhead bus (no trenches or basement preparation).
- Compactness of the design.

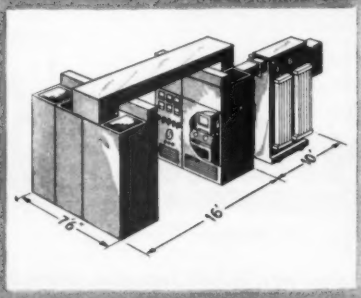
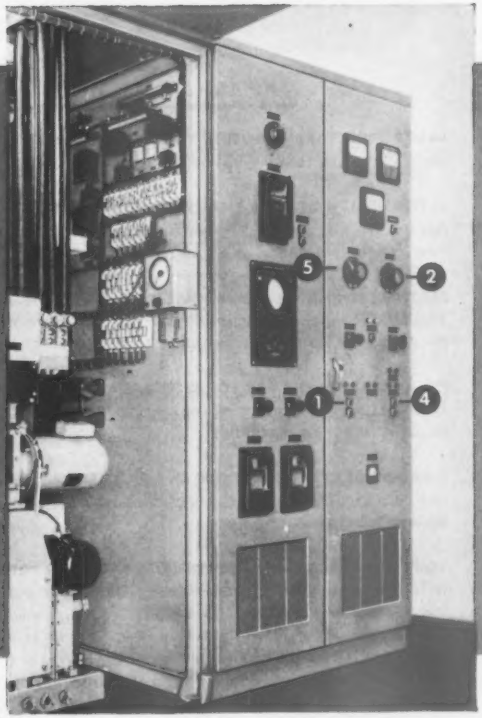


Diagram of typical mechanical rectifier installation. All elements of the unit including operating aisle are arranged in an area of 120 square feet. This does not include area occupied by transformer which is usually located outdoors.

I-T-E Mechanical Rectifier



All you do to start the
I-T-E MECHANICAL RECTIFIER

1. Push button to close a-c breaker.
2. Adjust d-c voltage to desired value.
3. Close d-c disconnect switch. (Not Shown)
4. Push button to close d-c breaker—you're on the line!
5. Adjust d-c current to desired value—automatic current regulator will hold that value—within ±1%!

I-T-E MECHANICAL RECTIFIERS OFFER THESE ADVANTAGES:

HIGH EFFICIENCY
96% or more in the 50 to 400 d-c voltage range.

SMALL SPACE REQUIREMENT
compact design, neat appearance.

LOW BUILDING INVESTMENT
no need for special foundation or unusual construction.

LOW INSTALLATION COST
put rectifier in place, connect, operate.

AVAILABILITY FOR SERVICE
no warming-up or speed-up period.

LOW MAINTENANCE COST
main contacts need only occasional replacement.

RUGGED TRANSFORMERS
conservative construction—latest design.

SIMPLE VOLTAGE CONTROL
voltage or current automatically controlled between ±1%.

MECHANICAL RECTIFIERS

I-T-E CIRCUIT BREAKER CO., 19th AND HAMILTON STS., PHILA. 30, PA.

R&IE EQUIPMENT DIVISION, GREENSBURG, PA.

CANADIAN MFG. AND SALES: EASTERN POWER DEVICES, LTD., TORONTO

EXPORT SALES: PHILIPS EXPORT CO., NEW YORK 17, NEW YORK

SIGNIFICANT DEVELOPMENTS IN PRACTICAL LABOR RELATIONS

TOLD IN BRIEF FOR BUSY FACTORY EXECUTIVES

By **PAUL A. KING**, *Attorney, Bigelow-Sanford Carpet Company, Inc. Member, New York Bar.*

LABOR SECRETARY SUGGESTS TOUGH COMMUNIST RULES. *Mr. Tobin's ideas are tough—but might work* . . . . . **page 206**

IS THE HEALTH OF YOUR EMPLOYEES YOUR BUSINESS? *Arbitrators have ruled both ways. One company wins by showing a promotion would endanger safety of others* . . . . . **Page 206**

FEATHERBEDDING BAN AIN'T WHAT IT WAS CRACKED UP TO BE. *The NLRB takes a narrow view of the law. A recent reversal by an Appeals Court is encouraging but not decisive* . **Page 208**

NO UNEMPLOYMENT PAY FOR WORKERS REFUSING TO CROSS PICKET LINES. *Although this is a ruling of a particular state, one of these days it may be extended.* . . . . . **Page 210**

CAN YOU GET YOUR NAME OFF AN UNFAIR LIST? *Chances are that the court won't give an injunction. You'll have to go to court to collect damages* . . . . . **Page 212**

YOUR CONTRACT CLAUSE DETERMINES VACATION POLICY. *Courts will interpret your clause literally, so watch out. Could mean big money some day.* . . . . . **Page 214**

BRIEF BUT IMPORTANT. *If poor work results from inadequate instruction . . . You are stuck if you give an unlawful increase . . . Employers must bargain during the term of the contract . . . A day off with pay for pallbearers . . . Retirement at 68 instead of the usual 65 . . . Foremen take notes on how the union contract is working out.* . . . . . **Page 216**

Labor Secretary Suggests Tough Communist Rules

A lot of suggestions were offered to the Humphrey subcommittee of the Senate Labor Committee for keeping communists out of labor unions. But Secretary of Labor Tobin came up with the toughest.

He would like to see a law barring communists from holding any position in a labor union. He also advocated an amendment to the National Labor Relations Act requiring the NLRB to treat communist-dominated unions the same way it treats company-dominated unions.

Is Your Employees' Health Your Business?

Your employees are apt to feel that their health is their own business; so when you deny one a promotion because the new job might endanger his health, you stand a good chance of having to argue the issue before an arbitrator. And there's no certainty that your arguments are going to be successful. Arbitrators have ruled both ways on the question.

However, just a while back, Mengel Co., Louisville, Ky., was successful in this case:

A woman door inspector was denied a promotion because the next higher inspection job required her to lift 100 pounds. She had lifted such weights before. But, on the recommendation of the safety director and plant physician, she was turned down.

In arguing its case, Mengel pointed to the agreement of federal, state, and private agencies dealing with the subject that women shouldn't lift more than 40 pounds. Mengel also argued that if se was given the job, others' safety would be endangered.

What makes it tough to win a case of this kind is the feeling among many union chiefs, arbitrators, and doctors that it's not up to the employer to be the guardian of employee health, particularly when a promotion is involved. In such cases your best bet is to show how the employee's health may be *your* concern by

Let's not clean away dollars and man-hours with costly, inadequate floor care

MECHANIZE *your floor-cleaning with a* COMBINATION SCRUBBER-VAC!

Wherever *combination-machine-scrubbing* is the practical solution to the floor-cleaning problem, any lesser, slower method is wasteful of money and manpower. A *Combination Scrubber-Vac* applies the cleanser, scrubs, rinses if required, and picks up (damp-dries the floor) — *all in one operation!* Maintenance men like the *four-in-one feature* . . . also the fact that the machine is simple to operate. It's *self-propelled*, and has a *positive* clutch. There are no switches to set for *fast* or *slow* — slight pressure of the hand on clutch lever adjusts speed to desired rate. The powerful vac performs efficiently and quietly. Cable reel is self-winding. Improved waterproof wiring and minimum electrical connections simplify the cleaning of the machine. *Model 213P Scrubber-Vac* at left, for heavy duty scrubbing of large-area floors, has a 26-inch brush spread, and cleans up to 8,750 sq. ft. per hour! (Powder dispenser is optional.)

Finnell makes *Scrubber-Vac Machines* in a full range of sizes — for small, vast, and intermediate operations. From this complete line, you can choose the size that's exactly right for *your* job (no need to *over-buy* or *under-buy*). It's also good to know that you can lease or purchase a *Scrubber-Vac*, and that *there's a Finnell man nearby* to help train your maintenance operators in the proper use of the machine . . . to recommend cleaning schedules for most effectual care . . . and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2507 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

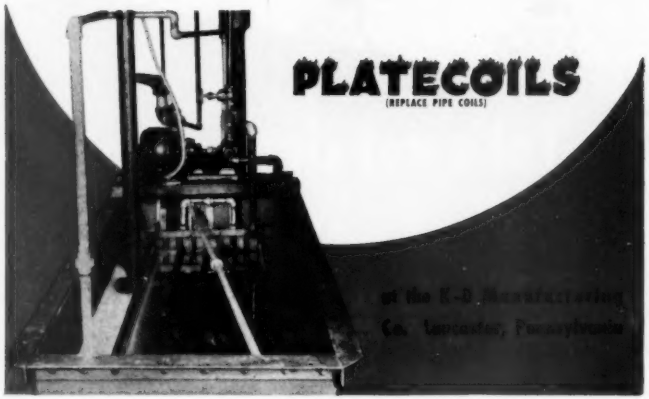
Conserve Manpower with Completely Mechanized Scrubbing

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything for Floor Care FINNELL

BRANCHES IN ALL PRINCIPAL CITIES



cool this quench oil tank for 1/3 the cost

At the K-D Manufacturing Company, a manufacturer of metal stampings, Platecoils were installed in an oil quench tank for only 1/3 the cost quoted by a standard heat exchanger manufacturer. Three hundred pounds of material per hour had to be quenched from 1600 °F. to 140 °F. with the quench oil being recirculated at 15 gpm. The Platecoils were specified to maintain oil temperature of 110 °F. using 75° cooling water at 6 gpm.

The efficiency of the Platecoils exceeded expectations, reducing the oil temperature to 85 °F. **within 25 minutes.** According to Mr. Madeira, Tool Room Foreman: ***"Under extreme summer temperatures and the largest loads ever quenched, the installation maintained the desired quench temperatures."***

The reason Platecoils cost so much less is they have so much more effective heating or cooling area in a limited space. For instance, a 22" x 47" Platecoil gives the same heat transfer surface as 32 ft. of 1½" pipe which would require approximately 30" x 60" of space. Thus a Platecoil only half the size often provides a much greater BTU transfer per unit area. This means savings in initial cost, tank space and installation time.

Everywhere that Platecoils are used the story is always the same: They heat or cool faster, can be installed quicker at only a fraction of the cost of other methods. Write for Bulletin No. P60.

PLATECOILS gives you these ADVANTAGES

- Cleaned and Repaired Without Dumping Tank Solution
- Greater BTU Transfer Per Unit Area
- Weighs Only Half as Much as Pipe Coil
- No Threaded Joints in Tank
- Increased Tank Capacity
- Fast, Easy Installation
- Easy to Clean

PRACTICAL LABOR RELATIONS

Begins on page 206

indicating how the safety of other employees is threatened (as Mengel did). Or you can show how your workmen's compensation and other costs are upped by an employee's assumption of a job that endangers his health.

Featherbedding Ban Ain't What It's Cracked Up to Be

If the union requests you to pay its members for work you don't need but which they are willing to perform, don't jump to the conclusion that the Taft-Hartley Act's ban on featherbedding will give you the right to say no.

The featherbedding ban is not as far-reaching as some employers originally thought it would be.

The ban says no to making an employer pay for work not needed and not performed. But if the union is *willing to perform* the work, the NLRB has ruled that the employer must pay for the work—even though it isn't needed, and the union doesn't actually perform it.

In a recent case, the National Labor Relations Board repeated its view. A theater was asked to hire a local orchestra whenever it hired a travelling band. Not only was the local outfit unnecessary, but hiring it would be a detriment. The Board said: Hire it anyhow. However, an appeal to a United States Court Of Appeals resulted in a reversal.

Unfortunately, the reversal in this case doesn't necessarily change the view of the Board—or the status of the law. Other Courts of Appeals can uphold the Board; and if you read the featherbedding ban carefully, the Board has a good case.

Turn the page

Stop Juggling your Production Time

Airfreight gives you extra working days for rush orders

WHAT HAPPENS to your factory when a big rush order comes in? Are you forced to juggle your production time—put aside previously scheduled jobs—pay mounting overtime charges?

Take heart in the fact that airfreight can eliminate these hurry-up headaches! Yes, through its miraculous speed of delivery, airfreight subtracts *days* that were once lost to crawling surface transportation—and adds them to your production schedule. Thus factory "flow" can continue uninterrupted and manufacturing costs are actually held down.

Proof? Just wire us collect and we'll have an American Airlines representative in your office promptly to show you the facts and figures. He'll also explain other equally important advantages of airfreight, such as its ability to make warehouse needs obsolete. American Airlines, Cargo Sales Division, New York 17, N. Y.

Check American First

For Every Airfreight Problem—Here's Why

CARGO CAPACITY
American has the greatest available ton-mile capacity of any airline

HANDLING FACILITIES
American's airfreight facilities are backed by the largest personnel force of any airline

EXPERIENCE
American has been operating airfreight service longer than any other airline

COVERAGE
American directly serves more of America's leading business centers than any other airline

KNOW-HOW
American has handled more freight than any other airline

AMERICA'S LEADING AIRLINE

AMERICAN AIRLINES INC.

More than twenty years ago, Universal Products Co., Dearborn, Mich. installed McCaskey Control for production of their numerous styles and sizes of universal joints and drive shaft, gaining . . .

FAST and EFFECTIVE CONTROL of PRODUCTION, COSTS AND TOOLS

Duplicate time tickets provide data for complete control at one-writing. Repeated postings of the same information have been eliminated. One copy is quickly filed on Planning Boards above, providing a visible record of progress and work-in-process by operations.

The other copy furnishes identical data for cost records. Both are immediately available at the end of operations or shifts.

McCaskey Tool Control has cut the loss of tools, time, tool breakage, and excessive inventories. These McCaskey Controls have successfully met changing requirements over the years. They continue today to provide control of essential production operations simply and effectively.

Write for a demonstration or for descriptive folders. No obligation, of course.

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send me folders describing the McCaskey Production, Cost and Tool Control systems.

Name .....

Position .....

Company .....

Address .....

FMM-7-52

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY
TOOLS • COSTS • PAYROLL
THE McCASKEY REGISTER CO.
ALLIANCE, OHIO
McCaskey Systems, Ltd., Galt, Canada
The McCaskey Register Co., Watford, England

PRACTICAL LABOR RELATIONS

Begins on page 206

No Unemployment Pay If Workers Won't Cross Picket Lines

This took place in Utah. It may not be the law in your particular state. But it's a decision that employers will hope will set a precedent. And it may very well do so, one of these days.

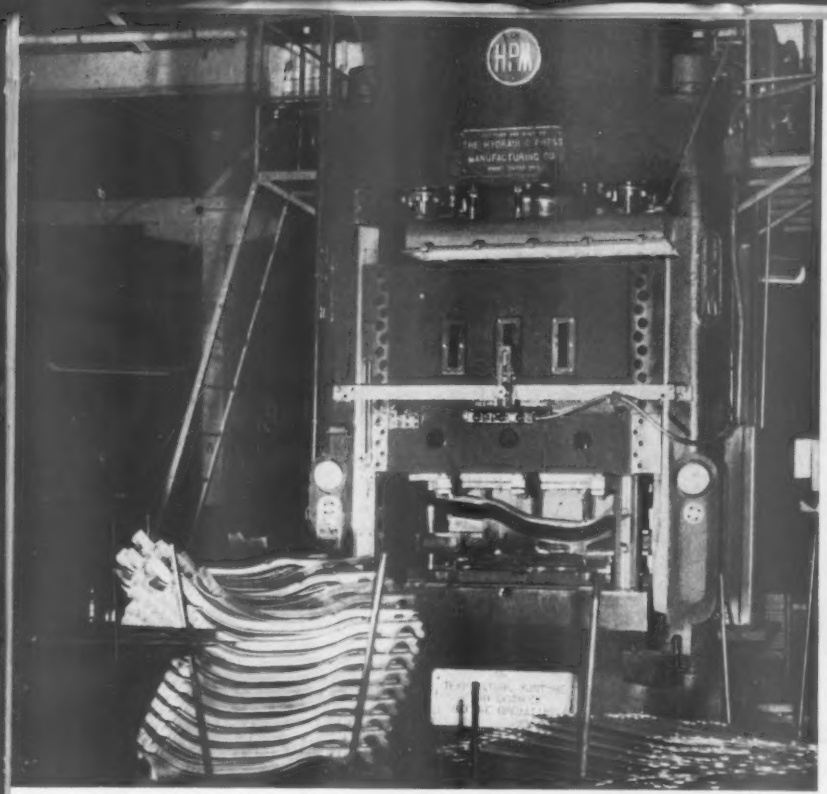
Here's the story: In two cases, Utah's State Supreme Court denied unemployment compensation fund benefits to non-striking workers.

One decision stemmed from the refusal of 648 workers of the American Smelting & Refining Co. to cross picket lines set up by the striking Switchmen's Union of America. The court upheld the Utah State Industrial Commission for its refusal to grant unemployment compensation to the smeltermen. The court noted that non-strikers "left work voluntarily without good cause." When union members honor picket lines, said the court, they are unemployed solely because they make their own free choice not to work in a plant where others are on strike.

"It is immaterial whether the claimant (for compensation) refuses to cross picket line because of his own personal conviction . . . or from his belief that his own union officials' decision should be obeyed."

In the second decision, the justices by a 4-to-1 majority overruled an Industrial Commission's finding that granted compensation to members of six AFL craft unions following a retaliatory shutdown by Associated General Contractors members during an AFL strike against two contracting firms in July, 1950.

Although the strike hit only a portion of the building industry, the court held the AGC to be



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THE BIG 400-ton hydraulic press shown above is used to stamp out parts for farm machinery in a big midwest plant.

When the press was first put into operation, plant operators followed the recommendation of a Standard Oil lubrication specialist and used STANOIL Industrial Oil in the hydraulic system. In over four years of continuous hard service, there has been no lost time because of inefficient performance of the hydraulic oil.

Oil capacity of the system is approximately 9 barrels; only 2 barrels make-up per year has been required. The oil in this system has never been changed. It has been centrifuged once to remove moisture which accumulated over three years' operation. Periodic tests of oil samples have shown that STANOIL Industrial Oil has maintained its high lubricating quality. A recent analysis showed no increase in viscosity of the oil, no change in color, and a neutralization number of only 0.13 mg. KOH/gm.

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You can rely on this unique many-purpose oil to give you the same clean, dependable service. Get the expert help of a Standard Oil lubrication specialist by phoning your local Standard Oil office.

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You'll find the means to significant savings in this booklet. It describes the important qualities of STANOIL Industrial Oil and the resultant benefits which have made this multi-purpose oil the choice of midwest manufacturers for a host of important lubricating jobs. Discover how STANOIL will give you superior protection through its unique combination of six outstanding characteristics, including high stability and effective rust prevention. Find how STANOIL can simplify stock, storage, and inventory in your plant by replacing special-purpose oils in hydraulic systems, speed reducers, air compressors, machine tools, electric motors, auxiliary turbines, and a wide variety of circulating, bath, and bearing systems. Ask the Standard Oil lubrication specialist from your nearby Standard Oil office for this booklet, or write: Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago.

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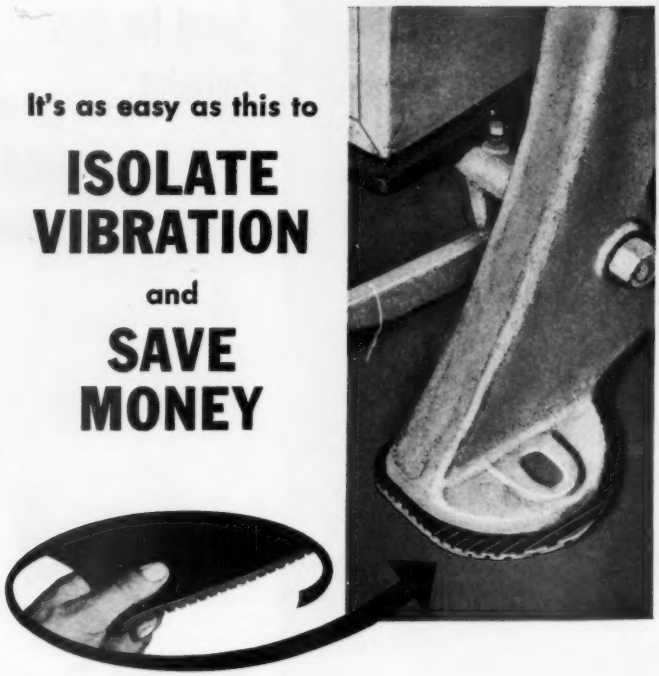

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Here's the durable mounting to absorb shock . . . reduce noise . . . cut your maintenance costs. In hundreds of installations, the Isomode Pad has proved to be not only one of the most economical mounts, but also one which does a superior job of isolating vibration.

This 5/16" thick, ribbed, resilient mounting works under legs or base of most equipment—even under large capacity punch presses! By absorbing the forces normally transmitted to floor, Isomode Pads reduce building damage and undue deterioration of machinery. With no bolting in most cases, it costs you less to install machines — to relocate them. And you get a quieter plant, besides.

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PRACTICAL LABOR RELATIONS

Begins on page 206

within its rights in stopping all jobs through a shutdown as a retaliatory measure during industry-wide negotiations. The court ruled, in effect, that the difference between a strike (where Utah workers are not entitled to compensation), and a lockout (where they are entitled to compensation) is dependent on individual conditions prevailing. Non-strikers were held to be "members of the group which gained a wage raise due to the strike . . . and parties to the scheme or plan to foment it."

Can You Get Your Name Off Unfair List?

Sometime or other the name of your company may be found on the "unfair" or "do not patronize" list of a labor union. Burned up because of the unjustness of the charge, you run to your lawyer to get him to stop the union—get your name off the list at once.

The chances are that he won't give you much more satisfaction than to recommend that you show damages and go to a court of law to collect them. It's not easy to get an injunction.

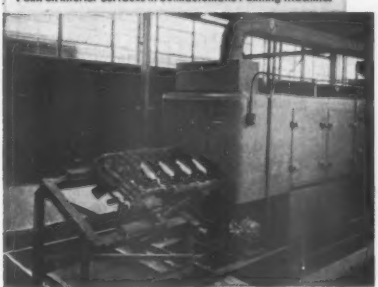
In a recent Illinois Appeals Court case, the judge said that "the rule of law appears to be well settled in this state that a court of equity will not enjoin the publication of a libel or slander." He also referred to a decision of the United States Supreme Court which held that "the publication by labor unions of a 'We Do Not Patronize' list is lawful and that its publication, unaccompanied by violence, is an exercise of the right of free speech guaranteed by the first amendment to the Constitution of the United States" (*Venturelli*).

Turn the page

COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

Projectile Casings Emerging from Dry-Off Oven at Cleveland Welding Company's Plant and Receiving Coat of Paint on Interior Surfaces in Semiautomatic Painting Machine.



Loading Point where Casings are Loaded in Special Conveyor Adapters at Entrance End of the Five-Stage Cleaning and Bonderizing Machine.

Equipment for Military Paint Specifications . . .
Processing Equipment for Cold Extrusion Operations!

Illustrated here you see a Complete Mahon Finishing System for automatically coating the inside and outside of projectile casings. The system includes a five-stage Metal Cleaning and Bonderizing Machine, a Dry-Off Oven, a semi-automatic interior Spray Coating Machine and a Hydro-Filter Spray Booth equipped with an adapter rotating device and automatic spray guns for coating the exterior of the casings. If you are in need of equipment to meet Military Specification JAN C-490 Grade No. 1, or PA-PG 191, the Mahon Company has already installed many complete systems and are thoroughly familiar with these requirements. Mahon engineers have also produced equipment for processing projectile cartridge cases, as well as complete equipment for Pickling, Bonderizing, and application of drawing solutions in connection with cold extrusion operations. When you turn your equipment problems over to Mahon, you immediately enlist the services of the best qualified engineers in this field . . . engineers with a background of experience and a wealth of technical knowledge and practical know-how not available to you elsewhere. See Sweet's Mechanical Industries File, or write for Catalog A-652.

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Your non-standard parts manufactured *complete* by the Kaufman *Double Extrusion* Process—a *tougher* product, produced with accuracy of dimensional detail—ready for your assembly line;

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originators of the Kaufman DOUBLE EXTRUSION Process
Ask your jobber for Cleveland Fasteners

PRACTICAL LABOR RELATIONS

Begins on page 206

Contract Clause Decides Vacation Policy

In case of dispute, what you *say* in the vacation clause of the contract is what counts—not your personal philosophy about vacations. For example, you may hold to the view that a vacation is for the purpose of resting up in preparation for the work to come in the following year. Hence, if your plant is shut down, and there is no year ahead, then there is no need for a vacation, or pay.

However, this view isn't shared by the courts today (nor by arbitrators, for that matter.)

Here's an example: A contract with the employees of the Wil-Low Cafeterias said that employees who completed six months employment in June, July, or August are entitled to three days' vacation with pay. Those who also completed a year's service in those months would receive a week. Some of the cafeterias closed down in June. Bankruptcy was the reason. Employees were discharged. A court held that employees who met the qualifications were entitled to vacations.

In another more recent case, the clause in effect provided that employees on a seniority list on Dec. 1, 1947, who completed six months' work after Dec. 1, 1946, would get vacation pay. In Sept., 1947, the company closed up because of lack of business. The court found that even though the employees may have met the first condition (six months' service) they didn't meet the second (on the seniority list on Dec. 1, 1947). (*Treloar, Mich. Supreme Court*)

The lesson to be learned from these cases is that it is the wording of the clause that counts. Draft it carefully.

Turn the page

"WE SAVED 48 **MAN-HOURS** on the 90 man-hour job of steamcleaning, rewiring and painting an overhead crane at our South San Francisco plant," says Fred Reibin, Plant Engineer, Enterprise Division, General Metals Corp.

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As if by magic, an aluminum alloy tower of any height desired is ready in minutes! Individual scaffold sections are set one on top of the other. Sections lock into place instantly. The tower rolls down aisles . . . straddles machinery.

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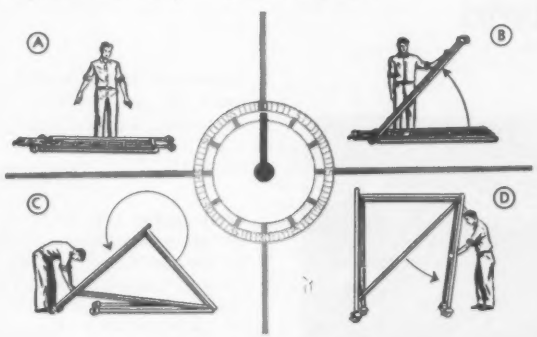

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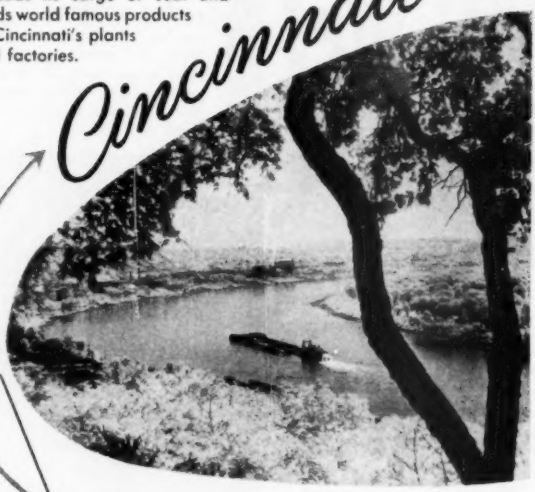

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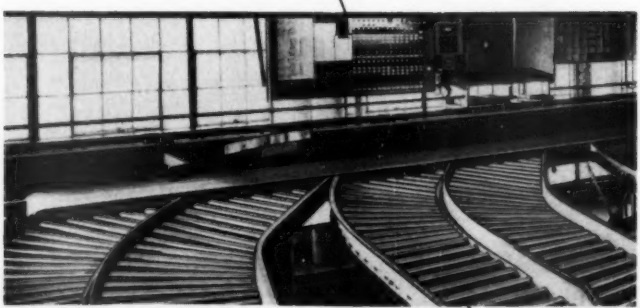

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PRACTICAL LABOR RELATIONS

Begins on page 206

BRIEF BUT IMPORTANT

If poor work results from inadequate instruction, you cannot discipline a worker for his defective work, an arbitrator rules. *(North American award, 18 LA 359)*

You are stuck if you give an unlawful increase—regardless of any approval that the Board may later offer—according to WSB Resolution No. 92. Retroactive approval of an unlawful increase will not clean your slate.

Employers must bargain during the term of the contract about matters not covered in the contract or discussed during negotiations, the NLRB warns. *(Jacobs Manufacturing, 30 LRRM 2098)*

A day off with pay for pallbearers at employee funerals is given by Great Lakes Carbon Co., St. Louis, Mo.

Retirement at 68 instead of the usual 65 is provided in the Mathieson Chemical Co. pension plan. Compulsory retirement is set at 70.

Foremen can take notes on how the union contract is working out. Pittsburgh Plate Glass has come up with a union contract booklet that is half-and-half: Top of the page carries a clause of the contract and the bottom is left blank. Foremen are encouraged to make notes about how the clause works out, and employees to record explanation of the clause by foreman or steward.

Mark this down in your book...

This GENERATOR can save up to 50% of your OXYGEN costs

For Metal Production and Fabricating

For Glass Welding and Sealing, etc.

For Chemical Processing, etc.

W&D 1-4213

FIRST UNIT OF ITS KIND—A PIONEER

The JOY Oxygen Generator was designed to supply commercial users of oxygen at actual savings up to 50%. It is an *exclusive* Joy development. The Model OX-20, illustrated, is rated to deliver 2000 cu. ft. per hour (about 2 tons per day). The complete line will include units ranging from ½ to 12 tons capacity daily of oxygen at 99.5+% purity.

OWN YOUR OWN OXYGEN PLANT

All the advantages of the Joy Generator become *yours.* It is simple to start and operate, can be easily handled by ordinary plant equipment personnel and is completely automatic in operation, requiring only occasional inspection and purity checks. What's more, the unit is *inherently safe*—along with a top operating pressure of only 185 psi, it has pop safety valves and an automatic shut-off system.

NO MESSY CHEMICALS

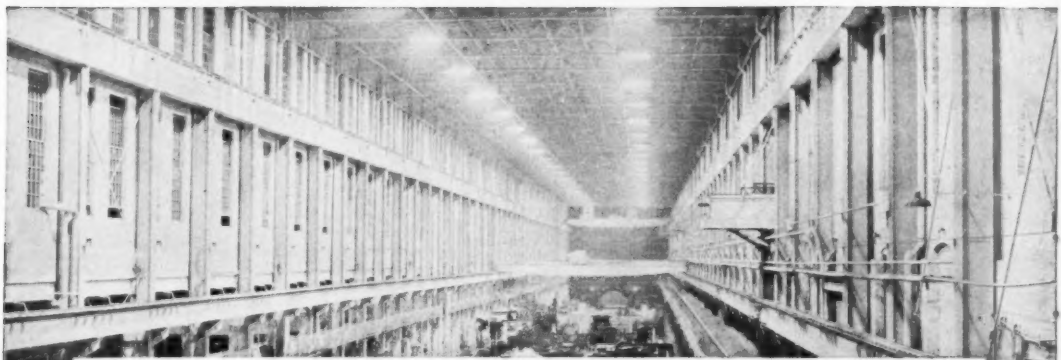
Joy "OX" machines are readily adaptable to single or multiple installations; and for feeding plant supply lines, filling cylinders, or both. The only raw material used is *air,* and the units are self-cleaning . . . no messy chemicals to supply, no residue to remove. ● Write us your oxygen requirements . . . *Joy Manufacturing Company, Oliver Bldg., Pittsburgh, 22, Pa.*

JOY

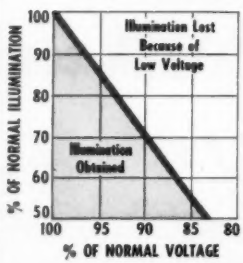
SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

Allis-Chalmers

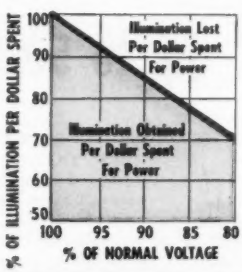
STOP Wasted



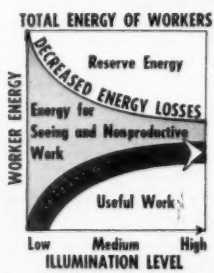
HOW UNDERVOLTAGE WASTES MAN-HOURS . . . CUTS PRODUCTION



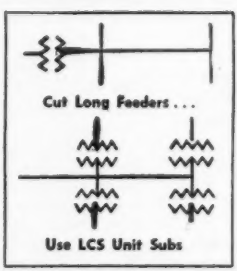
GOOD ILLUMINATION demands that rated voltage be maintained to all lighting fixtures. Illumination falls off rapidly on undervoltage . . . light output of filament bulbs is cut in half when voltage falls about 17%. Poor lighting causes eye strain . . . slows down workers . . . makes inspection difficult . . . causes increased scrap.



YOU PAY for illumination you don't get when you operate your distribution system at undervoltage. For example: at 10% undervoltage, illumination is cut 30% but power consumption is cut only 15%. Eliminate this power waste . . . get all the power you pay for by maintaining full voltage to all lighting fixtures.



MORE ENERGY AND TIME for useful work results from quicker seeing in well illuminated plants. In one case illumination was increased from 6 to 16 ft. candles (an increase from 83% to full voltage) . . . resulting in a 9% increase in production—20% decrease in accidents. Again, production increased 25% with an increase from 6.8 to 24.5 ft. candles.



A MAJOR CAUSE of undervoltage is the voltage drop in secondary feeders. Long lines of heavy copper carrying power at low voltage may prove inadequate as production schedules are stepped-up and new machines added. Install Allis-Chalmers LCS Substations at load centers to cut feeder length, reduce voltage drop and increase production.

Unit Substations

Manhours!

By Improving Illumination

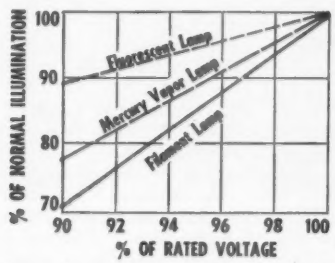
BOTH MACHINERY AND PERSONNEL gain efficiency when you install unit substations to correct undervoltage. That's because no worker can do his best *unless* his job is well lighted . . . no electrical equipment gives top performance *unless* it operates at proper voltage.

Filament bulbs, for instance, give 15% less than rated light when voltage falls only 5%. On undervoltage, fluorescent tubes and mercury lamps give less than rated light, are difficult to start, may flicker and go out. And when you operate at undervoltage, you are paying for power you're not using.

Eliminate power waste . . . manhour loss. Workers are more efficient, produce more work of better quality when illumination is adequate. Put *all* the power and manhours you're buying to work by maintaining proper voltage to all equipment. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate long runs of expensive low voltage cable. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install and provide protection to personnel.

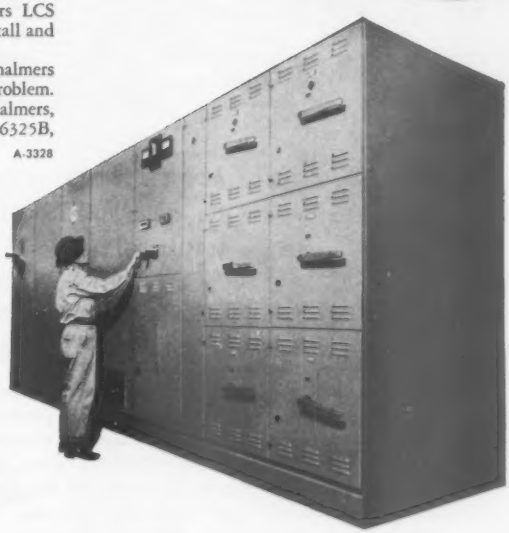
You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution problem. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for bulletins 11B6285A, 11B6325B, and 11B6895.

A-3328



Undervoltage reduces the light output of filament, fluorescent and mercury vapor lamps. Although light output is least affected on fluorescent lamps, undervoltage makes them flicker, hard to start. Mercury lamps go out altogether at 10% undervoltage . . . require up to 20 minutes to regain full light output.

LCS Unit Substations



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Logan Roller Conveyors, handling precision bearing housings between machine operations, are an integral factor in this mass production set-up.
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American Industry—"Originated the mass production idea and constantly improves it."

"Make 'em by the million", is a purely American expression, which in itself suggests huge economies and efficiencies.

Modern production lines, ingenious jigs and dies, improved machine tools, skills developed through repetitive operations — all are contributing factors in the cost-cutting mass production idea. And handling equipment, like Logan Conveyors, is recognized as indispensable to mass operations. Through every productive phase, Logan equipment speeds output, takes the strain off human shoulders, aids American mass production processes.

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ELECTRICAL EQUIPMENT

10 Automatic Controls
Condensed catalog is handy reference for selection from maker's line of automatic controls. Includes starters, control accessories, and electronic devices, gives specifications and features. 8 pages. Bulletin No. GEA-5781. General Electric Co.

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Turn the page

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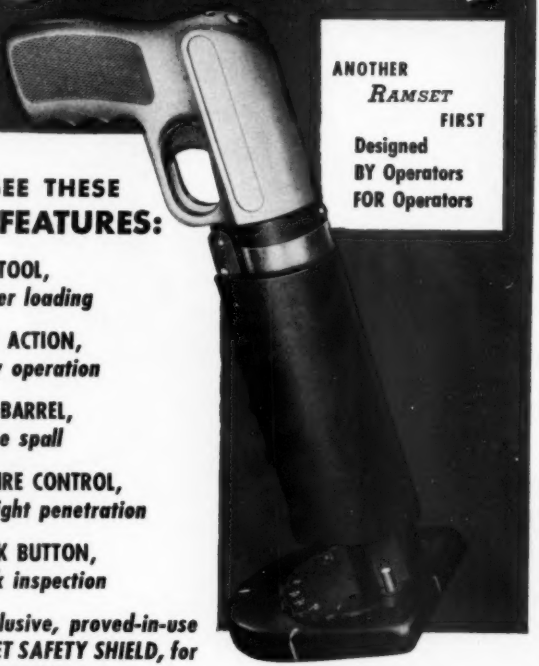
Globes, Angles, Checks

Why buy more valve than you need? Why spend extra dollars putting 150-pound valves on service lines carrying 125 pounds of steam pressure—or less? O-B's *new* No. 16 Line valves will handle 125 pounds of working steam safely and economically. Cast of high-grade steam bronze, these new solder-type valves can be repacked under full pressure and feature hard rubber replaceable discs plus a free-swivelling, self-levelling disc holder.

On your next tubing job specify O-B No. 16 Line Valves. Or if you are using pipe, ask for O-B No. 15 Line—same valve but with threaded ends.

NEW smoothness... NEW efficiency in powder-actuated fastening...

Ramset JOBMASTER



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SEE THESE
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- ANGLE-FIRE CONTROL, *for straight penetration*
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- *Plus exclusive, proved-in-use ROTO-SET SAFETY SHIELD, for accurate positioning*

Faster, lighter, easier handled, the new RAMSET JOBMASTER sets a record pace for steel and concrete fastenings. Properly trained workmen quickly become skilled operators because of smooth, simple, natural motions of loading, placing, firing. Positive controls bring improved accuracy and efficiency . . . and still lower fastening costs. Ask your dealer for demonstration of how RAMSET's years of pioneering have made the new JOBMASTER the proved-in-performance leader.

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13 Roller Conveyors
This 16-page catalog (No. 100) gives you specifications and applications of gravity roller conveyors. There are detail drawings, parts descriptions, and illustrations for each item in the line. Harry J. Ferguson Co.

14 Roller Conveyors
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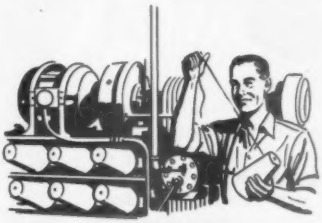
CLEAN AIR

Soap manufacturers strive continually to achieve high standards of purity in their products. But industrial dusts raise hob at various stages of processing. American Blower equipment has helped several soap companies overcome this problem. American Blower fans and air washers, for example, are highly effective. The fan supplies an ample supply of circulating air. The air washer cleanses, purifies and freshens the air while removing dust and water-soluble odors.



YARN ABOUT YARN

A textile manufacturer was continually changing pulleys or setting the machine rate on his ring-spinning frames to fit the material that worked at the lowest speed. He'd heard about American Blower Gyrol Fluid Drives and decided to try them. Results were amazing. Gyrol Fluid Drive permitted a higher output within safe limits of the material, allowed spinning frames to start gradually with less yarn breakage. For your business, wouldn't smooth power transmission and adjustable speed control be a distinct advantage?

YOUR BUSINESS

If your needs call for heating, cooling, drying, air conditioning, or air handling equipment, you'll find American Blower an excellent source of supply. For data, phone our nearest branch office.

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Gyrol Fluid Drives

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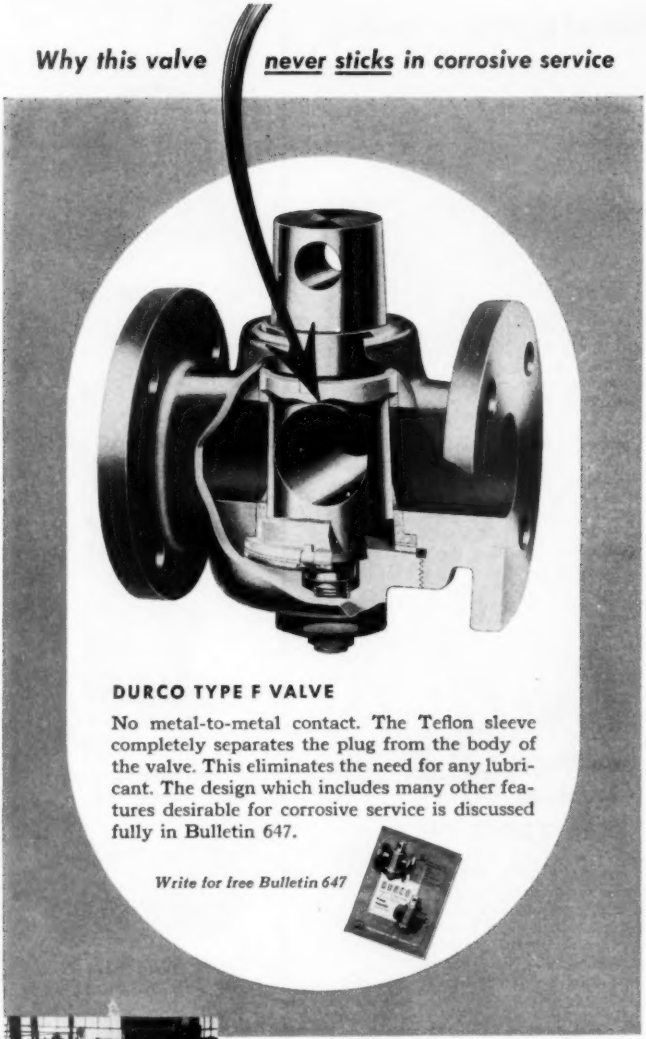
Why this valve never sticks in corrosive service



DURCO TYPE F VALVE

No metal-to-metal contact. The Teflon sleeve completely separates the plug from the body of the valve. This eliminates the need for any lubricant. The design which includes many other features desirable for corrosive service is discussed fully in Bulletin 647.

Write for free Bulletin 647

Standard Durco equipment solves specialized corrosion problems

For more than 40 years Durco has provided the answers to specialized corrosion problems — often before industry asked for the answers. The resulting equipment now comprises the standard Durco product line. If you have a tough corrosion problem, the Durco representative near you is ready to help.

DURCO **THE DURIRON COMPANY, Inc.**
Dayton, Ohio

Use the coupon on page 138 or 226 to get these important

Free NEW CATALOGS

Begins on page 138

AIR HANDLING

18 Here's a 60-page catalog devoted to air conditioning, air cleaning, and air handling equipment. Also sections on applications and engineering data. Indexed, with a handy chart to simplify selection. Catalog No. 600. Westinghouse Electric Corp.

19 Crane Cab Coolers
This 24-page catalog shows you how crane cab coolers and conditioners increase worker's comfort. Illustrations and descriptions of products offered, selection and operation data. Gives specifications, tells when to use. Catalog No. 1301. Dravo Corp.

20 Dust Control
"The Control of Industrial Dust" is the title of this 28-page catalog. How-it-works data, features of maker's equipment, and hints on selection. Case histories illustrate who should control dust. Sections on modernizing old equipment, too. Pangborn Corp.

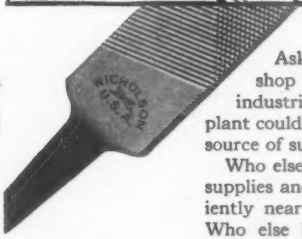
21 Exhaust Hoods
"Manual of Exhaust Hood Design" gives you engineering information on dust control systems for metal working industries. Photographs show types of hooding for various operations, and tables help you decide what you need. Bulletin No. 270-E1. American Air Filter Co., Inc.

22 Air Filters
Reusable air filters are subjects of this 8-pager. Included are viscous panel, range hood, and spray booth types. Gives performance data, specs, suggests how to use. Also tells about filter cleaning procedure. Bulletin No. 100. Dollinger Corp.

Turn the page

POP'S school of Filing

STEP UP, BOYS, AN' SHAKE HANDS WITH AN OLD FRIEND O' MINE! 'CASE YOU DIDN'T KNOW IT, HE'S ONE O' YOUR BEST FRIENDS, TOO!
SMART LOOKIN' FELLER – WHO IS HE?
SALESMAN FROM TH' INDUSTRIAL SUPPLY HOUSE. HE'S TH' GUY WHO GIVES US DOUBLE-QUICK DELIV'RIES WHEN WE NEED FILES!
STAN RANDALL



Ask Pop or any other experienced shop foreman what he thinks of the industrial distributor. He'll tell you the plant couldn't run without that dependable source of supply.

Who else has the tools, machines, parts, supplies and accessories you need, conveniently near and ready for fast shipment? Who else has the broad experience and product know-how to give your shop first-aid in production problems?

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He knows more about a wider range of tools for industry than any one manufacturer can know. And he's always ready to help your men keep abreast of mechanical improvements and new techniques.

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Marketing through distributors is a policy that has made Nicholson files and Nicholson quality available to industrial file users from coast to coast.

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We have spent more than a quarter century building up that precious backlog of experience. We have spent a minimum of 300,000 engineering and research hours seeing to it that our customers get precisely what they need—which actually means anticipating their need for improved MIKRO equipment to do an ever better job in pulverizing, liquid or dry milling, blending and industrial dust control.

Twenty-eight years on one job add up to a lot of savvy, but they don't necessarily mean hardened arteries or long whiskers. An industrial organization is as young as its dynamic enthusiasm. We haven't stopped growing. Recently we built two wings increasing production facilities by 25%.

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PULVERIZING MACHINERY COMPANY
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IMPORTANT NEW Free CATALOGS

Begins on page 138

MISCELLANEOUS

23 In-Plant Feeding
You learn how to design and operate a plant cafeteria in this 55-page booklet. Gives sample layout drawings and tips on organization and menus, describes available equipment. Useful charts. Hotpoint, Inc.

24 Drum-Type Packaging
Folder tells you about a corrugated fiber drum that can be designed in any size or type to meet your packaging needs. Gives features, photographs, and brief case studies from four companies that use the custom-made packages. Gaylord Container Corp.

25 Heat Exchangers
Principles, features, and applications of a heat exchanger for cooling, heating, cooking, and drying is subject of this 8-pager. Details on installation, photographs. Catalog No. HF 101. Western Precipitation Corp.

26 Partitions
Here's a 16-page catalog on expanded metal angle-frame partitions. There are photographs of available models, typical layout sketches, and detail drawings. Specifications, erection instructions. Catalog No. WC-184. Wheeling Corrugating Co.

27 Coatings
This series of five bulletins describes tar-base coatings for protection against corrosion. Specifications and suggestions on use. 24 pages. Bulletin Nos. PC4-8. Pittsburgh Coke & Chemical Co.

28 Magnetic Mounts
In this 4-page folder you'll find a series of magnetic mounts for test indicators, magnifiers, and other equipment. Price lists, application photos, and features. Bulletin No. 604. Enco Mfg. Co.

For catalogs 29 through 46 see Plant Engineering Problems, page 228, and Plant Operating Problems, page 232.

DUPLICATE COUPON ON PAGE 138

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I'm circling the numbers of the catalogs and bulletins I want:

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"I decided long ago to stop buying scrap rags and waste by the pound and switch to Kex wiping towels because a lot of the stuff we were getting wasn't usable. It had no uniformity and the men had to pick and choose the right piece for every job. That isn't true with Kex—every square inch is usable.

"After the first few months of using Kex Service my month-end cost for wipers was down substantially! The men have a uniformly-sized, absorbent towel for every job. And we don't run the risk of scratching or damaging delicate precision machinery."

YOU DON'T BUY A THING—just pay a low monthly rental. Kex towels are distributed nationally—for complete information, see your Classified Telephone Directory for nearest Kex distributor, or write Kex National Service, 295 Fifth Avenue, New York 16, N. Y.

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It isn't Kex unless it's imprinted with the Kex name

Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 138 or 226.

NEED MORE COLD PROCESS WATER THIS SUMMER? Graham Mfg. Co., Inc., claims its steam vacuum refrigeration is reliable, low cost, easy to operate, and compact. Needs little maintenance, the company adds. *(Circle No. 29 on coupon, page 138 or 226)*

HOW TO STRIP TOUGH FINISHES FROM CONVEYOR HOOKS and hangers without dismantling: Use Strip-Aid, says Klem Chemicals, Inc. The non-toxic, non-corrosive chemical is said to save material, time, and heat. *(Circle No. 30 on coupon, page 138 or 226)*

TO CUT LUBRICATION TIME on your screw or roller conveyors, why not try oilless bearings? Arguto Oilless Bearing Co. says you can use them as replacements in existing conveyors. They offer protection against wet, abrasive, corrosive, and high-heat conditions. *(Circle No. 31 on coupon, page 138 or 226)*

YOUR GASOLINE LIFT TRUCKS SMOKING OIL? Then Ucon Brand lubricants can save you up to 2 quarts of petroleum motor oil per day per truck, reports Carbide and Carbon Chemicals Co. Technical information bulletins explain lubricating qualities, other characteristics of the product. *(Circle No. 32 on coupon, page 138 or 226)*

HOW TO CUT COOLANT FILTRATION COSTS UP TO 75%: You can do it with the Houdaille Web-O-Matic, says Honan-Crane Corp. The self-cleaning web-type filter eliminates filter changes, extends coolant life, protects equipment. Two

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...but it's easy to go wrong in choosing floors

This greaseproof SPECIAL KENTILE Floor resists hot cooking greases and oils...cleans to colorful newness with minimum of effort and expense.

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CHOOSING the wrong floor for a particular room or area all too often results in excessive upkeep costs...frequent repairs or replacement. That's why it is economical as well as practical to call in the Kentile Flooring Contractor.

He is an expert with years of experience in selecting the one right floor for every flooring need...from heavy duty greaseproof flooring required for working areas to the dignified flooring best suited for offices.

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Begins on page 228

Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

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models to fit your installation requirements. *(Circle No. 33 on coupon, page 138 or 226)*

WHAT PREVENTIVE MAINTENANCE SCHEDULES should you set up on electrical equipment? Westinghouse Electric Corp. makes suggestions in a 28-page booklet. Schedules of duties on power equipment are presented in chart form; another section gives you what-to-do data. *(Circle No. 34 on coupon, page 138 or 226)*

IF YOU NEED TEMPORARY STORAGE SHELVING, the National Corp. claims its prefabricated sectional wood shelving is just the thing. Bulletin gives features and specifications for the flexible, removable shelving, tells how to erect. *(Circle No. 35 on coupon, page 138 or 226)*

TO REDUCE SUMMER SUN GLARE IN YOUR PLANT: Paint your windows on the inside or outside with Luminall Turquoise, L421. Luminall Paints Div., National Chemical & Mfg. Co. says it gives you a light reflection value of 64%, is ideal for skylight or clear glass fenestration. *(Circle No. 36 on coupon, page 138 or 226)*

HOW TO PREVENT DETERIORATION OF STANDBY EQUIPMENT FROM DISUSE: Autocon Alternators will automatically insure regular use of standby unit, standby operation of either unit, or operation of both units together, says Automatic Control Co. Designed for pumps, compressors, blowers, other motor-driven equipment. *(Circle No. 37 on coupon, page 138 or 226)*

"FASTER, Smithers, FASTER!

The sooner we send this coupon the sooner we'll get complete information on J&L Comparators!"

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for Jones & Lamson's new booklet, "Comparators —what they are and what they do." In non-technical language, it describes the functions and applications of J & L Comparators. These precise optical instruments are used throughout industry for inspecting and measuring parts and products ranging in variety and size from pen points to propeller shafts.

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Machine Tool Craftsmen Since 1835

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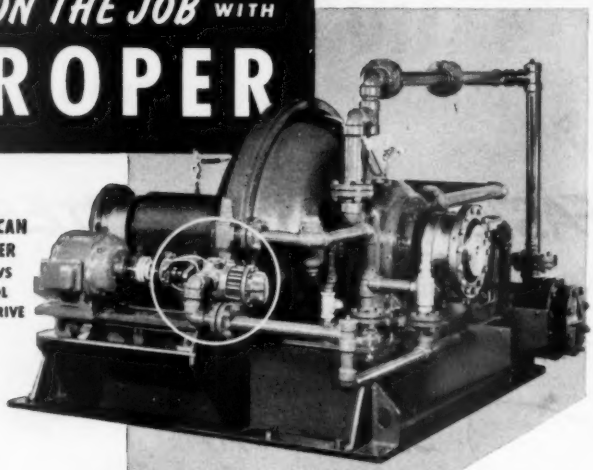
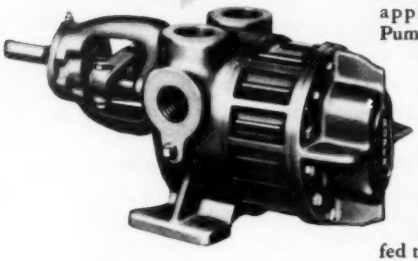


AMERICAN BLOWER TYPE VS GYROL FLUID DRIVE

ANOTHER EXAMPLE SHOWING ROPER PUMPS AS INTEGRAL PARTS OF MODERN MECHANISMS



Gyrol Fluid Drives — for supply pumps, compressors, draft fans, and other industrial applications — use Roper Pumps to govern speed variation. In this model, the oil is taken from the oil reservoir and is added to the Fluid Drive working circuit to increase speed, or oil is removed from the circuit to decrease speed. The lubricating oil is constantly fed to all bearings. The Fluid Drive unit shown is a size 27 Type VS with maximum ratings of 518 HP at 1400 RPM.

SERIES F PUMP

Roper Series F Pumps — the models used as original equipment on Gyrol Fluid Drives — are recommended for pressures up to 300 PSI and come in 1 — 300 GPM sizes. They feature 4-port design offering eight optional piping arrangements (4 for CW and 4 for CCW rotations) . . . a factor which cuts installation time and costs. Equal size gears run in axial hydraulic balance; pumps furnished in standard or stainless steel fitted models; available with or without relief valve — with mechanical seal or packed box. Investigate what Roper Rotary Pumps can do for you!

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Rotary Pumps

Good Ways to Solve Special PLANT ▶ OPERATING PROBLEMS

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HOW TO SIMPLIFY METAL FORMING OPERATIONS: Why not look into the new flexible die technique? Cincinnati Milling Machine Co.'s new catalog tells you all about Hydroform—applications, advantages, equipment, principles. *(Circle No. 38 on coupon, page 138 or 226)*

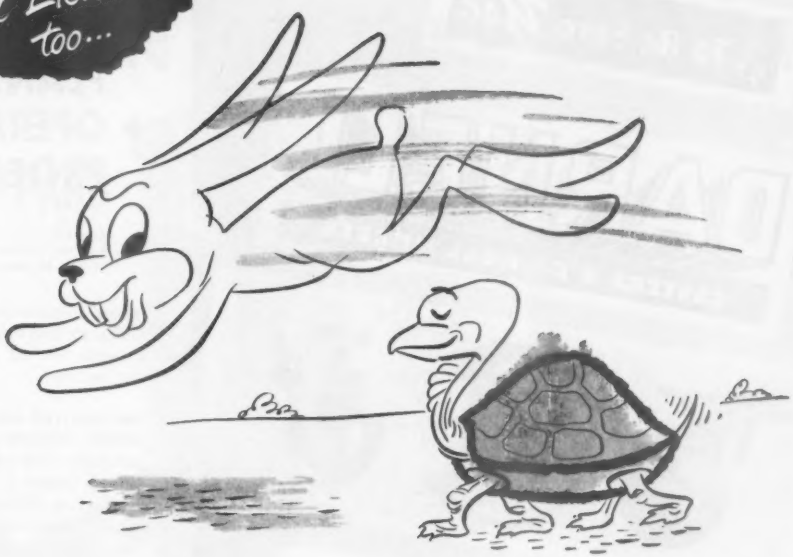
TO GET YOUR PACKAGING AND LOADING SPECS UP TO DATE: Signode Steel Strapping Co. has a catalog that shows you the newest ways to use steel strapping. There are sections on tools, seals, and accessories, with charts and tables for reference. *(Circle No. 39 on coupon, page 138 or 226)*

FOR A SUPERSENSITIVE CONTROL DEVICE, Carboloy Dept. of General Electric Co. suggests Thermistors. They're electronic control elements that respond to minute temperature changes. Catalog describes operation, types available, uses. *(Circle No. 40 on coupon, page 138 or 226)*

NEED TO CHANGE PROCESS HEATING TO MEET PRODUCT CHANGES? Bulletin shows you how standard electric panel oven components can be rearranged to fit production requirements. Also includes data on fuel costs, temperature cycles, steps in the design of process heating methods. Jensen Specialties, Inc. *(Circle No. 41 on coupon, page 138 or 226)*

ARE YOUR LIQUID ASSETS UNDER CONTROL? Neptune Meter Co. says its Auto-Stop Meter automatically controls the quantity of liquids fed into processes or batching operations. Shuts valve at pre-set point. Maker says it

with Freight Elevators too...



SPEED CAN BE DECEIVING

Jack-Rabbit starts are fine for the track. High cruising speeds are taken for granted in today's automobiles.

And—when planning changes in your freight elevators, speed is an important consideration. But it's only one of *many* factors involved.

To make sure you get the *complete* answer to any vertical transportation problem, ask for the help Westinghouse can give you. For Westinghouse elevator engineers are experienced specialists—at your service without obligation to you. These men are trained to assist you in freight elevator planning, selection and installation.

Westinghouse considers freight elevators an integral part of your materials handling system. The freight elevators you need are determined by such factors as your building's size, permissible floor loads, and type of product or merchandise to be moved. The right number and type of elevators are recommended that will contribute most to the overall efficiency of your materials handling system.

To get a better idea of the important assistance available from Westinghouse elevator engineers, write for the book, "Buyer's Guide for Freight Elevators." This Guide has received wide acceptance among architects and engineers. It will surely put you on the right track in solving your vertical transportation problems.

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"Buyer's Guide for Freight Elevators." 46 informative pages on design, lifting capacity and size, layouts, etc.

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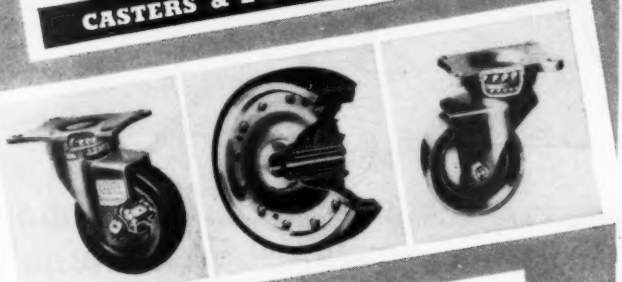

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Begins on page 232

Good Ways to Solve Special

▶ PLANT OPERATING PROBLEMS

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saves ingredients, keeps quality uniform, and eliminates handling. *(Circle No. 42 on coupon, page 138 or 226)*

GETTING THE MOST OUT OF YOUR NICKEL PLATING? For the latest complete information, International Nickel Co. has a 44-page booklet on "Practical Nickel Plating." Information on electroplating, data on mechanical properties of deposits, and commonly used solutions. *(Circle No. 43 on coupon, page 138 or 226)*

CAN POWER HAND TOOLS SPEED YOUR PRODUCTION? Ingersoll-Rand Co. thinks so, offers a 36-page catalog covering a complete line of multi-cycle electrical tools. Covers Impactools, nut runners, drills, screw drivers, grinders, buffers, sanders, and polishers. *(Circle No. 44 on coupon, page 138 or 226)*

A NEW, FAST WAY TO CLEAN FOUNDRY FLASKS: Try Alvey-Ferguson's A-F washing machine. It's said to remove the sand quickly and completely for efficient flask assembly. High-pressure spray cleaning system scours the conveyorized flasks. *(Circle No. 45 on coupon, page 138 or 226)*

ARE FORGING DIE COSTS OUT OF LINE? Maybe you're not using the right type of die block to start with. "Die Block Handbook" is an 80-page booklet that describes die blocks and hot-working die steels made by Heppenstall Co. Recommends proper types, heat treating. *(Circle No. 46 on coupon, page 138 or 226)*

FOR HALF THE USUAL COST
FULL ELECTRIC FORK TRUCK OPERATION

from LEWIS-SHEPARD

LEWIS-SHEPARD took a need and built this truck around it!

For cramped areas: right angle stacks in 8′ aisles.

For limited floor load capacities: weighs 2500 to 3000 lbs. W/O battery.

For rugged duty: All welded construction, full gear drive.

And because of Lewis-Shepard's unique One Design Line it can be priced lower than any other electric fork truck

Persistent repeat orders from scores of blue ribbon companies are the very best proof that the "J" will give you all these money saving features . . . ***Plus*** **LEWIS-SHEPARD QUALITY.**

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THE MOST COMPLETE LINE IS THE MASTER® LINE

"We standardized on SKIL Tools because they consistently out-performed all others!"

—says **J. L. Pettit,** plant manager,
METALWASH MACHINERY CORPORATION, Elizabeth, New Jersey

"The bulk of Metalwash Machinery Corporation's production of pickling, degreasing and drying machines now goes to defense industries," says Mr. Pettit. "Under present conditions," he continues, "we are working at full capacity on heavy machinery, work that asks the *most* of portable grinding and drilling tools.

"Years ago, we found SKIL tools out-performed *other* brands. Saved man hours through durable performance. Saved valuable materials through the most efficient operation and accurate performance of all the tools we tried!

"And," this plant manager observes, "we find it *far* easier to plan a production schedule when we *know* all drilling and grinding problems will be solved easily with SKIL tools because we've *proved* by experience they are *production* tools.

"It's easy to see why we've standardized on these rugged top quality tools."

SKIL Disc Sander
Model 13

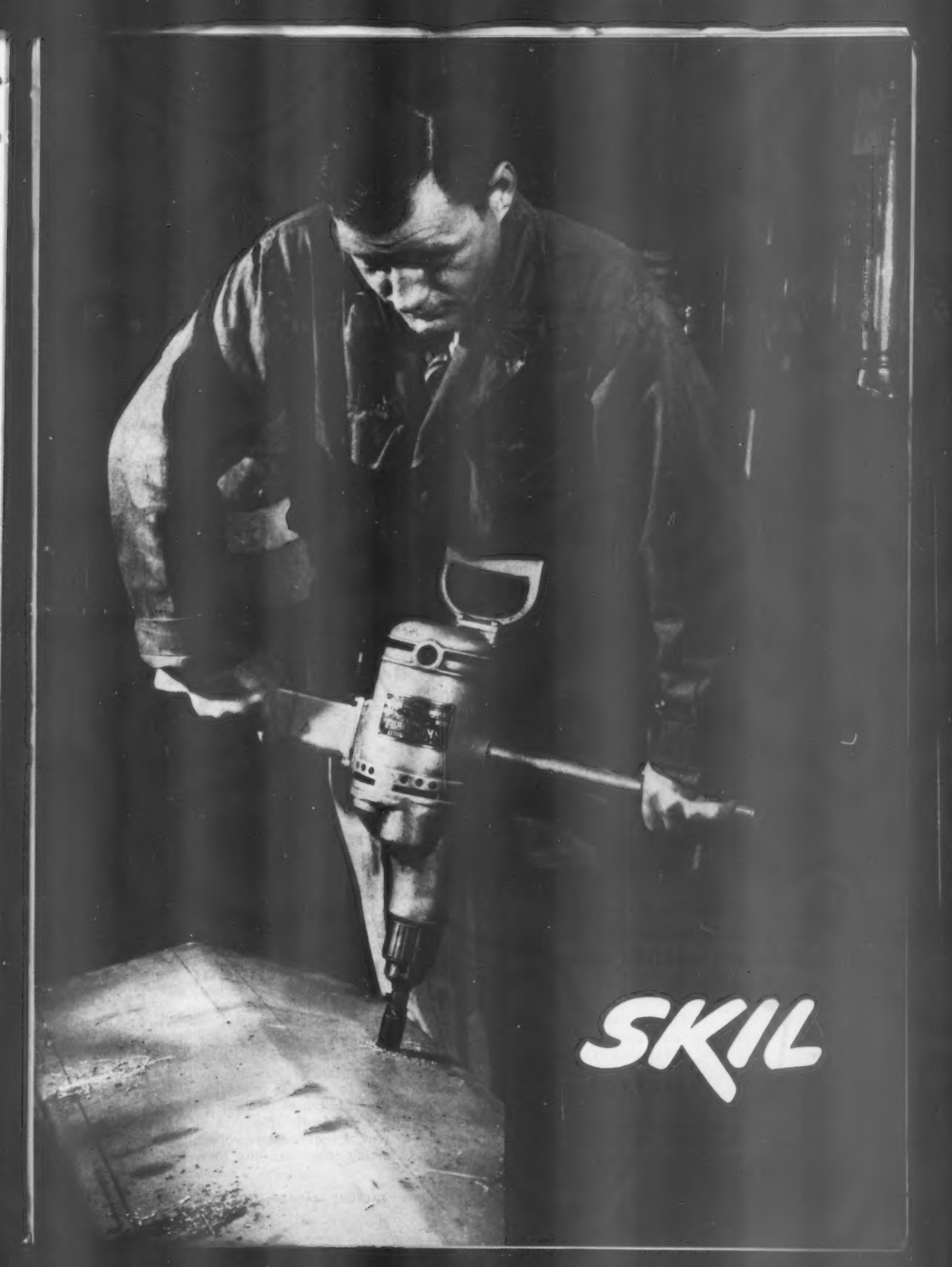
Heavy duty. Capacity: 9" backing pad and disc; 6" wire cup brush or 5" cup grinding wheel. Spindle diameter: ⅝"—11 thread. Speed: 4200 r.p.m., no-load. Length over-all: 18", not including pad. Net weight: 14¼ lbs.

Thomas Fitzsimmons uses a ⅜" SKIL Drill with a 1" hole saw. He stresses, "SKIL Drills have plenty of guts. Drilling in steel hour after hour is a tough job, but these SKIL Drills deliver top performance, day after day!"

Thomas Petroski is using the Model 13 SKIL Disc Sander with a cup grinding wheel to smooth a weld seam on an air-washer (designed to remove acids and other impurities from air). He states, "I get my job done *faster* and *better* with a SKIL Disc Sander because it has plenty of speed and reserve power for this heavy work."

SKIL Drill
Model 2103

Heavy duty ⅜" drill. Capacity in steel: ⅛" to ⅜". Capacity in hardwood: ⅛" to 1½". No-load speed: 450 r.p.m. 1000 r.p.m. at extra cost. Full-load speed: 275 r.p.m. standard. Length over-all: 16⅛". Net weight: 14¼ lbs.


SKIL

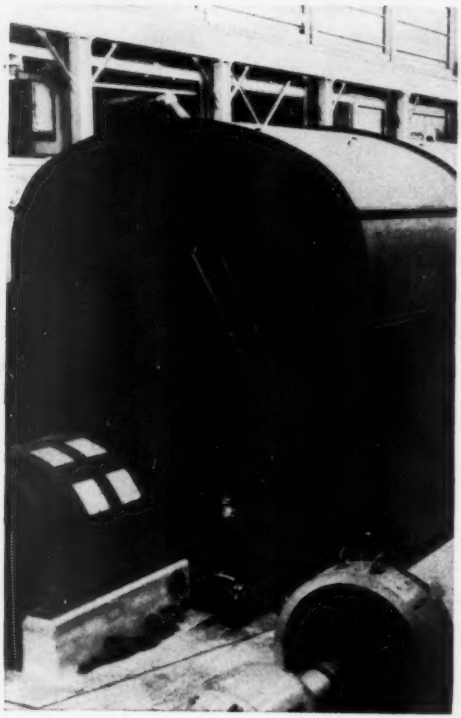
YOU MUSTN'T MISS—

INDUSTRIAL NEWS, BEGINNING ON THIS PAGE

TIMELY HINTS TO BETTER MANAGEMENT ON PAGE 250

QUOTES FROM INDUSTRY'S LEADERS ON PAGE 262

IDEAS TO STIPULATE YOUR THINKING, ON EVERY PAGE



TEST BEGINS as big generators power circuit breakers.

TEST ENDS minutes later as engineers check performance..

INDUSTRIAL NEWS

$10-Million Lab to Develop Switchgear

THAT'S GENERAL ELECTRIC COMPANY'S latest answer to the vast power needs of today—and of the future.

Big news is that you'll no longer have to design your power systems on the basis of equipment now available. Instead you can plan the system for best operation. From there, G-E will develop the switchgear to meet requirements.

Objectives • Main ideas of the new Philadelphia lab are:

1. To develop circuit-breakers of higher ratings.
2. To speed development of switchgear equipment of all types.
3. To study effects of voltage, current, frequency, overvoltage, recovery, arcing time, reclosing time, light cur-

SEE THE INSIDE STORY OF WHY

Dayton V-Belts last for YEARS!

Exclusive Dayton 327-V blend of natural and synthetic rubbers. Blended for tension —stretches easily and returns to original position instantly. Eliminates distortion and heat build-up.

Every cord has thousands of continuous filaments of high-tenacity rayon! And the *complete* surface of each cord is fully rubber coated by Dayton's new *Thoro-Bonding* process. Result: high resistance to fatigue . . . great flexibility . . . high tensile strength!

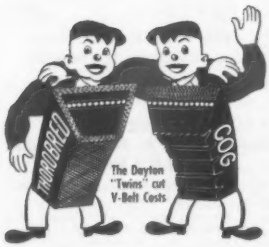
Special compound (812-V) for compression section of belt only. Compresses with minimum "prodding"* of cords during flexing —maintains crosswise rigidity.

*The upward thrust of the compression section against the cords.

All-weather, rubber impregnated cover, made of costly, "Hi-Twist" fabric, for better flexing, longer wear. Proper bias angle maintained at all times for easy flexing.

Find out how much money this better belt can save you!

Ask your Dayton Distributor to give you the complete Inside Story of Dayton Thorobred Belts. His complete line of belts solves every drive problem! You'll find his name listed under "Belting" in your telephone directory.
Dayton Rubber Company, Dayton 1, Ohio.



Dayton Rubber

Since 1905

WORLD'S LARGEST MANUFACTURER OF V-BELTS

© D. R. 1952

Is THIS your bottleneck?

Today's faster business pace makes one fact clear. In many plants and offices the regular exterior telephone system is not enough! It may actually be a bottleneck! Kellogg SELECT-O-PHONE breaks that bottleneck!

- **INCREASE PRODUCTION**
- **IMPROVE EFFICIENCY**
- **REDUCE COSTS**

Automatic, requiring no operator and independent of your switchboard, SELECT-O-PHONE is the modern means of transmitting orders, of exchanging ideas with individual executives or groups *inside* your business!

GET THE FACTS

Many of the greatest names in commerce and industry are already using SELECT-O-PHONE! For complete information, send coupon today to:

SELECT-O-PHONE Dial Intercommunication Systems are sold, installed and serviced by factory trained, franchised dealers all over America.

KELLOGG

Select-O-Phone

THE *INSIDE* VOICE OF BUSINESS

Hear's How

MAIL COUPON TODAY!

SELECT-O-PHONE DIVISION, Dept. 7-G
Kellogg Switchboard and Supply Company
6650 South Cicero Avenue, Chicago 38, Illinois
Please rush your new "Hear's How" Booklet that explains how I can benefit from dial intercommunication.

Name.....
Company.....
Street.....
City.....Zone.....State.....

YOU MUSTN'T MISS—

Begins on page 238

rent, temperature, and other conditions affecting switchgear equipment.

4. To reduce costs.

Laboratory facilities • There are three main units:

The control building • This building houses intricate controls and instruments used in conducting short-circuit tests. There are also administrative offices and record storage facilities.

The test building • It's divided into two sections: One contains incoming power source equipment and miscellaneous testing equipment. The other is equipped with a machine and assembly shop for preparing apparatus for test. Five cells can handle tests up to 15.5 kv. on power supplied from generators. Short circuit currents as high as 500,000 amperes at 600 volts can be provided.

The high-voltage test yard • It has two 100,000 kva. single-phase testing transformers, grounding and tap-changing switches, lighting arrestors, two 10,800 kva. capacitor banks and high-voltage connections for tests above 15.5 kv. and up to 440 kv. Two concrete dugouts serve as observation stations.

Communications and services • A tunnel links the test and control buildings, also carries 400 miles of interconnecting electrical conductors, steam, water, compressed air, and pneumatic delivery tubes.

Test recording • During short-circuit testing, magnetic and cathode-ray oscillographs automatically record to the millionth of a second what goes on during the test.

Film records of equipment performance can be developed and delivered to engineers for study two minutes after the test is completed.

Turn the page

Use LAYKOLD asphaltic products for your maintenance work. All from one source, near you—in handy sized containers. All applied cold—no special equipment needed.

FOR ROOFS . . .

LAYKOLD FIBRECOAT—in Black, Red or Green. Mica-filled for long life. Meets Military Specif. MIL-R-3472. Apply with brush, mop or spray.

FOR FLOORS . . .

LAYKOLD TILE SET, WOOD BLOCK CEMENT, FLOOR MASTIC BINDER and STEP GRIP. Standards in industry for over 20 years.

FOR WALLS & INSULATION

LAYKOLD WATERPROOFING and WEATHERCOAT. Also Insulation Adhesive and LAYKOLD Cement for cold insulation repair.

ROADS & PARKING AREAS

BITUMULS Emulsified Asphalt. Ideal for easy patching and sealing of paved areas.

Send for Illustrated Bulletins

AMERICAN Bitumuls & Asphalt COMPANY

200 BUSH ST., SAN FRANCISCO 4, CALIF.

Providence 14, R. I. Perth Amboy, N. J.
Baltimore 3, Md. Columbus 15, Ohio, Mobile, Ala.
Tucson, Ariz. Seattle, Wash. St. Louis 17, Mo.
Baton Rouge 2, La. Inglewood, Calif.
Oakland 1, Calif. Portland 7, Ore.
Washington 6, D. C. San Juan 23, P. R.

7-Month Test proves

BoL Tan® leather insole Sweat-Resistant

Examine closely the two safety-shoe insoles that are illustrated here. They were cut from a single pair of shoes worn by a foundry worker for seven months.

The insole shown on the left is a BoL Tan leather Insole. The other insole is an ordinary leather insole, the standard of the work shoe industry.

The condition of the two insoles reveals the remarkable advantage of the BoL Tan leather insole and its sweat-resistant value.

Note BoL Tan Leather Insole still soft and pliable, shown by cut section lifted for inspection.

BoL Tan Insole remains comfortable, permits re-soling when ordinary leather insole fails.

Ordinary insole is cracked, curled, saw-edged and dried out ... damaged by perspiration.

Ordinary insole is unfit for further wear. Shoe is discarded long before it is worn out.

HY-TEST SAFETY SHOES

HY-TEST ANCHOR FLANGE* SAFETY SHOES

*TRADEMARK REG. U. S. PAT. OFF.

The World's Largest Selling Safety Shoe

Division of International Shoe Company, St. Louis 3, Mo.

New York Office: Suite 1708, 225 W. 34th St.

Use this handy coupon for details on HY-TEST's *BoL Tan* leather insoles.

HY-TEST SAFETY SHOES, Dept. F7
Division of International Shoe Company
St. Louis 3, Missouri

Please send me free copy of your folder explaining the advantages of *BoL Tan* leather insoles.

Name.....

Firm.....

Address.....

City.....Zone.....State.....

WILLSON

dependable eye protection

keeps you on the safe side

WILLSON SAFETY EQUIPMENT

Combined protection, comfort and appearance make Willson safety spectacles outstanding in value. Choose from a full range of metal and plastic frames—fitted with Super-Tough* heat-treated glass lenses, or Plas-Tough* plastic lenses—every one tested for impact resistance and optical quality. Send for catalog describing our complete line of safety equipment.

METAL FRAME Latest style spectacle with single bridge. Have Hi-Line temples with a "dressy" look. Also available with side shields. (Non-flammable plastic frame Style WKS shown at top.)

CHOOSE YOUR FAVORITE LENSES FOR ANY WILLSON SPECTACLES

Three popular types of lenses are available for all Willson Spectacles. Clear glass Super-Tough*, Willsonite® Green Super-Tough* and the new Plas-Tough* lenses that combine the impact resistance of heat-treated glass with the comfort of lightweight plastic.

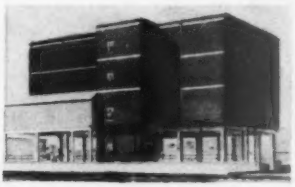
*Trademark

See your WILLSON distributor or write for Catalog

WILLSON PRODUCTS, Inc., 218 Washington St., Reading, Pennsylvania

YOU MUSTN'T MISS—

Begins on page 238



FLOOD-PROOF construction is feature of this new Kansas City, Kan., plant.

Stilted Structure Flouts Future Floods

Here's another way to beat the floods (FACTORY, June 1952, page 84). When the flood waters finally receded from its drowned-out buildings, a Kansas City company decided it wouldn't get caught again with its plants down. So the latest addition to Mid-West Cold Storage & Ice Corp. is being built on stilts.

The 4-story reinforced concrete cold storage plant will rest on 25-ft. concrete columns in an area where the flood waters stood at a depth of 10 feet. Total cost for the 64x129-ft. building: $150,000.

Russians Do Good Job of Copying U. S.

Don't sell the Russians short on industrial know-how. True, they may copy American designs, says Caterpillar Tractor Co., Peoria, Ill., after a detailed examination of Russian tractors. But they do a good job of it.

The Stalinetz 80 tractors, copies of Caterpillar's Model D7, were captured by United Nation's troops in Korea. Then U.S. Army Engineers asked the company to make a study of them. Here's what Caterpillar said:

1. The machines were redesigned to fit more convenient metric dimensions — no mean engineering feat.

2. Appearance was unimportant, but careful attention was

What do you do when it takes hours... sometimes days... to change v-belts?

1 **Put one or several maintenance men on the job**

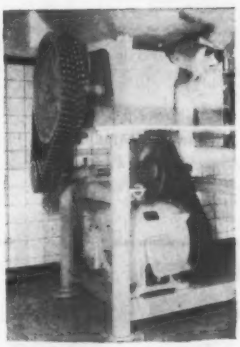
...and pay for repairs while production stands still

2 **Pay overtime**

...and have repair costs eat away your profits

3 **Standardize on VEELOS...**

...and change belts in up to 1/10th the time
...save labor, save time and save overtime
...keep machines producing for maximum profit



Comparison proves the value of VEELOS...

Minimum Inventory—4 reels of Veelos in the O, A, B and C widths can replace up to 316 different sizes of endless v-belts. If you use only one width of v-belt you can stock just one reel of Veelos.

Quick Installation—link construction makes it unnecessary to remove outboard bearings.

Complete Adjustability—vibrationless, full power delivery is assured because uniform tension on each belt in a matched set can be maintained.

VEELOS DATA BOOK

gives complete details on construction, installation and uses. We'll gladly send you a free copy of this 28-page fact-full book... write today.

MANHEIM MANUFACTURING & BELTING COMPANY
604 Manheim St., Manheim, Pa.

VEELOS
THE LINK
V-BELT

ADJUSTABLE TO ANY LENGTH · ADAPTABLE TO ANY DRIVE

Made in all widths in three types: regular, oil-proof, static conducting. Also in double V in O, A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. VEELOS is known as VEELINK outside the United States.

BETTER SEEING TOOLS FOR INDUSTRY

FOSTORIA
LOCALITES
INCREASE WORKERS' EFFICIENCY

Light the Vital Seeing Zone
on Machine Tools, Inspection and Assembly Benches

Directs Light Exactly where Needed as Easily as Pointing Your Finger

MODEL 3267-H-174
Overall length 32¾". Three instantly adjustable joints. Flat oblong base for machine screw mounting.

$6.12 EACH in pkg. of 6
Single Units $7.65 ea.

- **Rugged Construction** withstands vibration and rough handling
- **Instantly Adjustable** with flexible ball and socket joints
- **Baked Enamel Finish**—Exterior, Smooth Gray—Reflector Interior, high temperature White
- **Reflector** accommodates 100 watt or any A-19 or A-21 medium screw base lamp
- **Wired Complete** with switch socket and 8 ft. oil resistant cord and moulded plug

LOCALITE fostoria for Light ON the Job
Reg. U. S. Pat. Off.

WRITE FOR COMPLETE CATALOG of Localite models with various type reflectors, arms and bases for every industrial use.

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO

Localites are available through electrical wholesalers everywhere.

"Since They Got Fedders Water Coolers This Place Is Empty 'til Noon"

20 Years
20 ANNIVERSARY WATER COOLERS

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water coolers

Time out is time off when everybody hightails it to Joe's. Another reason why it's good business to have plenty of refreshing, perfectly cooled drinking water conveniently located in all office, sales and production departments. Save money and increase productivity by installing Fedders Water Coolers today. Write Fedders, Dept. F-15

FEDDERS-QUIGAN CORPORATION
57 TONAWANDA STREET BUFFALO 7, N. Y.

YOU MUSTN'T MISS—

Begins on page 238

given to spots where finishes and close tolerances were required. Anti-friction bearings were very good.

3. Metallurgy was very good, although raw materials differed slightly.

4. Assembly procedures were probably similar to Caterpillar's.

Concluded the Company's engineers:

"We would criticize their manufacturing techniques on some parts and feel sure that the life of their machine would not be up to our standards.

"However, on the whole, we feel that it is a machine which would give satisfactory operation."

New Way Coming to Keep Tools Cool

A built-in cooling system is the feature of a new type of cutting tool said to increase minimum tool life up to 300%.

In the Kool Tool, recently announced by International Engineering & Mfg. Co., Cleveland, coolant flows through the tool to the cutting edge. It's foolproof, efficient, and gets the coolant where it's most needed, the company says.

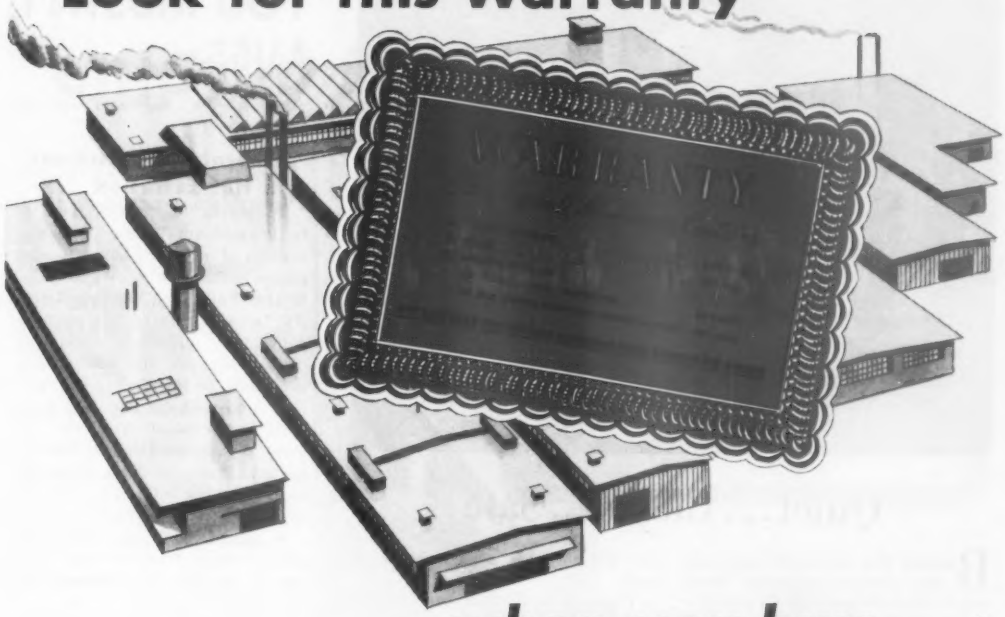
The tool doesn't require special installation on ordinary lathe work, and can be used with conventional pressure cooling systems now in use. And it's adaptable for turret or any other multiple-type machine, company engineers claim.

How it works · You put the tool on the lathe as any ordinary tool. Then attach a coolant hose which directs a continuous flow of coolant through a chamber in the tool to the cutting surface. You need no further adjustment.

Availability · You can't buy it yet. But the company hopes to have it on the market soon.

Turn the page

Look for this Warranty



when you buy

ASPHALT-ALUMINUM ROOF PAINT OR COATING

It's your assurance of LOW-COST, LONG-LIFE ROOF PROTECTION!

The Warranty above assures the right amount of aluminum pigment in an approved vehicle for Asphalt-Aluminum Roof Paint and Coating. This Warranty is your positive assurance of economical, lasting, one-coat protection for your industrial buildings with rustable metal or built-up roofs.

When asphalt and aluminum are properly combined, as specified in the above Warranty, aluminum flakes rise to the surface and "leaf" on the drying asphalt to form a firm metallic shield. This shield reflects the actinic rays of the sun and thus protects the asphalt base against drying out . . . adds years and years to roof life. Because aluminum coated roofs reflect up to 85% of radiant heat rays, buildings are cooler in summer and warmer in winter. Employee efficiency and morale are increased . . . air cooling and heating costs are reduced.

Remember—only the finest Asphalt-Aluminum Roof Paints and Coatings, made by leading manufacturers, carry the Warranty Seal. Look for this Warranty before you buy. Write for names of Asphalt-Aluminum Roof Paint and Coating manufacturers to **Reynolds Metals Company, 2518 South Third Street, Louisville 1, Kentucky.**

This advertisement appears in the interest of the Roof Paint and Coating Industry of the United States

Quiet... Clean... Safe

Because they are quiet, clean and safe, battery industrial trucks can be used without restriction in virtually any department of the plant or warehouse including confined quarters as well as areas devoted to processing foods, pharmaceuticals and other products demanding utmost cleanliness. They can even be provided with spark-enclosed construction for operation in hazardous locations.

They use low-cost electric power for battery charging; and they use it with maximum economy, because they start instantly, yet consume no power during stops. With electric-motor drives and EDISON Nickel-Iron-Alkaline Storage Batteries, they have a minimum of wearing parts; are easy to maintain, are rarely out of service for repairs. With batteries exchanged at convenient intervals, they operate around the clock with the highest dependability and lowest overall operating costs.

EDISON batteries have these important features:

They are durable mechanically; grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.

They can be charged rapidly; gassing cannot dislodge the active materials.

They withstand temperature extremes; are free from freezing hazard; are easily ventilated for rapid cooling.

They are foolproof electrically; are not injured by short-circuiting, reverse charging or similar accidents.

They can stand idle indefinitely without injury. Merely discharge, short-circuit, and store in a clean, dry place.

They are simple and easy to maintain.

As a result of these features, they are the longest-lived of all storage batteries. In fact, they have such long life that they effect important economies in depreciation charges. And they are so trouble-free that they cut maintenance charges too. Send for bulletin *Modern Material Handling* for further details of the advantages of electric-motor drives and EDISON batteries. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. Thomas A. Edison of Canada, Limited, Montreal.

You can always rely on

EDISON

Nickel-Iron-Alkaline Storage Batteries

YOU MUSTN'T MISS—

Begins on page 238

Fiberglas Is Lubricant in Hot Extrusion

Fiberglas has proved itself to be a lubricant in the American version of a French hot extrusion process. Babcock & Wilcox Co., Beaver Falls, Pa., has found that it's far superior to the carbon-containing materials previously used. Here are the advantages, according to B&W:

- Increased die life. The glass melts on contact with the hot steel, prevents seizing of the billet and tools, and insulates the tools from the intense heat of the billet.
- Increased production. The glass reduces friction, thus making it possible to increase billet length.
- Improved surface quality. There's no carburization of surfaces.

How it works · The billet, after heating, travels on a transfer car toward the extrusion press. At the same time it rolls down an incline on the car on which a Fiberglas blanket has been placed. The hot billet rolls itself up in the blanket, which fuses to the metal.

At the press, a Fiberglas "sock" is stretched over the mandrel, and a Fiberglas cartridge placed against the die. This insures lubrication of all other surfaces.

Extrusion takes place in from 2 to 4 seconds. Tube lengths vary from 20 to 60 feet, depending on the size of the billet and the area of the extruded section.

On stainless, too · The process is especially good for making seamless tubing of stainless and high-alloy steels not readily obtainable in seamless form. And it works for several varieties of free machining stainless steels which have not been successfully pierced by the rotary piercing method.

Turn the page

Isn't it time YOUR business enjoyed these savings, too?

Only YALE gas trucks have these cost-cutting features:

FLUID DRIVE
3 to 8 times longer clutch life

HYPOID GEARS
30% more strength against shock loads

SHOCKLESS STEERING
passenger car steering ease

AUTOMOTIVE-TYPE BRAKES
smoother, safer stops

ROLLER CARRIER UPRIGHTS
less friction and more efficiency

65-HP ENGINE
waterproofed and built for rugged constant service

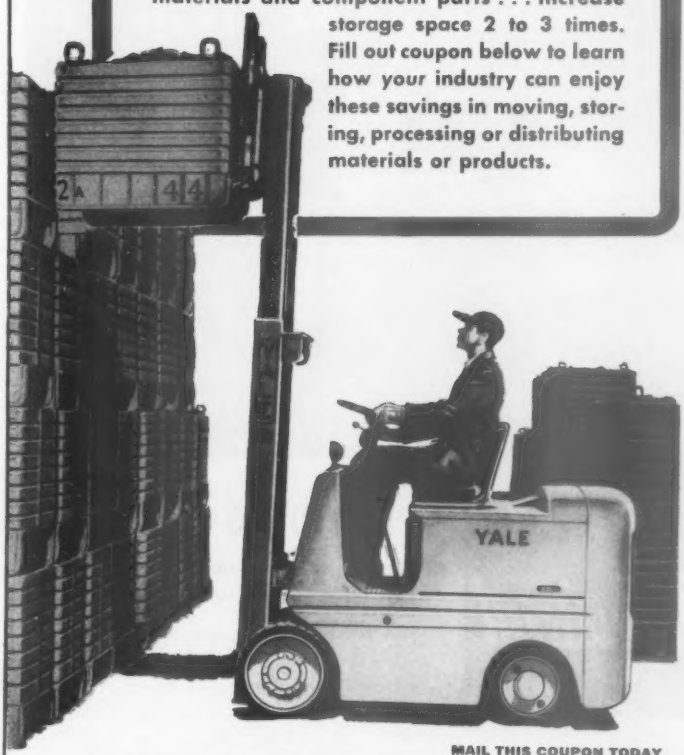
• The modern methods of materials handling made possible by YALE Gas Trucks can cut as much as 75% off your handling costs. You save on maintenance, too, by avoiding the overhauling and parts replacement necessary with less durable equipment.

No matter what your industry, YALE Gas Trucks can provide money-saving advantages no other Gas Trucks can offer you. Get the full story from your YALE representative... he's fully qualified to recommend the equipment that will do the best job for you. Or, fill out and mail the coupon.

YALE is a registered trade mark of The Yale & Towne Manufacturing Co.

YALE
MATERIALS HANDLING EQUIPMENT

In the air conditioning industry, Yale Gas Trucks save time and money in moving bulky packing materials and component parts . . . increase storage space 2 to 3 times. Fill out coupon below to learn how your industry can enjoy these savings in moving, storing, processing or distributing materials or products.



MAIL THIS COUPON TODAY

The Yale & Towne Mfg. Co., Dept. 37-A
Roosevelt Blvd. & Haldeman Ave., Philadelphia 15, Pa.

How can YALE Industrial Gas Trucks do more—save more—for me?

☐ Please have your local representative call

☐ Please send free copy of
THE PICTURE STORY OF YALE MATERIALS HANDLING EQUIPMENT

Company_____

Name_____ Title_____

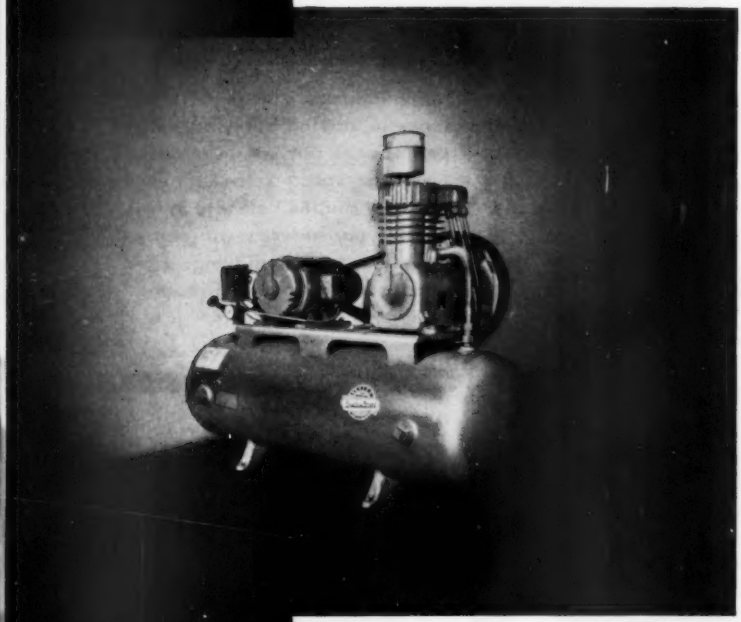
Street_____ City_____ State_____

In Canada write: The Yale & Towne Manufacturing Co., St. Catharines, Ont.

YALE GAS AND ELECTRIC INDUSTRIAL TRUCKS • YALE WORKSAVERS • YALE HAND TRUCKS • YALE HAND AND ELECTRIC HOISTS • YALE PUL-LIFTS

NEW!

SCHRAMM ANNOUNCES ITS IMPROVED LINE OF SMALL INDUSTRIAL AIR COMPRESSORS



THE SMALL *Industrial*

SIZES—½ HP to 5 HP

MOUNTINGS—Horizontal or vertical air receivers or on base.

DRIVES—Electric motors on gasoline engines.

AVAILABILITY—Immediate delivery.

PROVIDING

New, greater, overall efficiency —through engineering extras!

New features, new advantages, are offered you in the small Industrial Schramm stationary air compressor. Quickly, we predict, it will fit into today's "Factory of the Future."

ALL-NEW FEATURES:

Improved head design.

Positive controlled force-feed oiling to every wearing surface.

Main Bearings—Tapered roller bearings. Crankshaft supported at both ends.

Larger radiation fins.

Bucket-high drain for ease of use!

We invite you to write today for new literature GC-52.

SCHRAMM, INC.

The Compressor People

WEST CHESTER • PENNSYLVANIA

SCHRAMM INDUSTRIAL AIR COMPRESSORS

YOU MUSTN'T MISS—

Begins on page 238

Big German Press Set Up in U. S.

A giant German forge press of World War II vintage is now at work in the American metalworking industry.

The 15,000-ton Schloemann press, leased from the U.S. Air Force, will make it possible for Aluminum Co. of America's Cleveland Works to produce large aluminum and magnesium forgings for aircraft faster and more economically than before.

With auxiliary equipment, the press is valued at $6.2-millions. Installed, it's 22 feet long, 18 feet wide, and extends 18 feet below ground level and 36 feet above. Individual parts weigh up to 120 tons.

To house the press, the company built an aluminum-clad structure equivalent in height to a 5-story building.

New AEC Office to Aid Industry

Greater cooperation between industry and the Atomic Energy Commission is coming via AEC's recently announced Office of Industrial Development. Purpose: to insure that developments in the atomic energy program which may have industrial applications are quickly made available to interested plant people.

Actually, lots of companies are already using radioactive isotopes in various phases of plant operation. (See FACTORY, April 1952, page 116.) And if you'd like to know just what each of the companies is doing with atoms, you'll want to look at "Radioactive Isotope Applications of Industrial Significance," a new AEC publication.

Write the Office of Technical Services, Department of Commerce, Washington 25, D. C., for your copy. Price: 30¢.

Turn the page

20,000 c.f.m. at 110 lbs. pressure

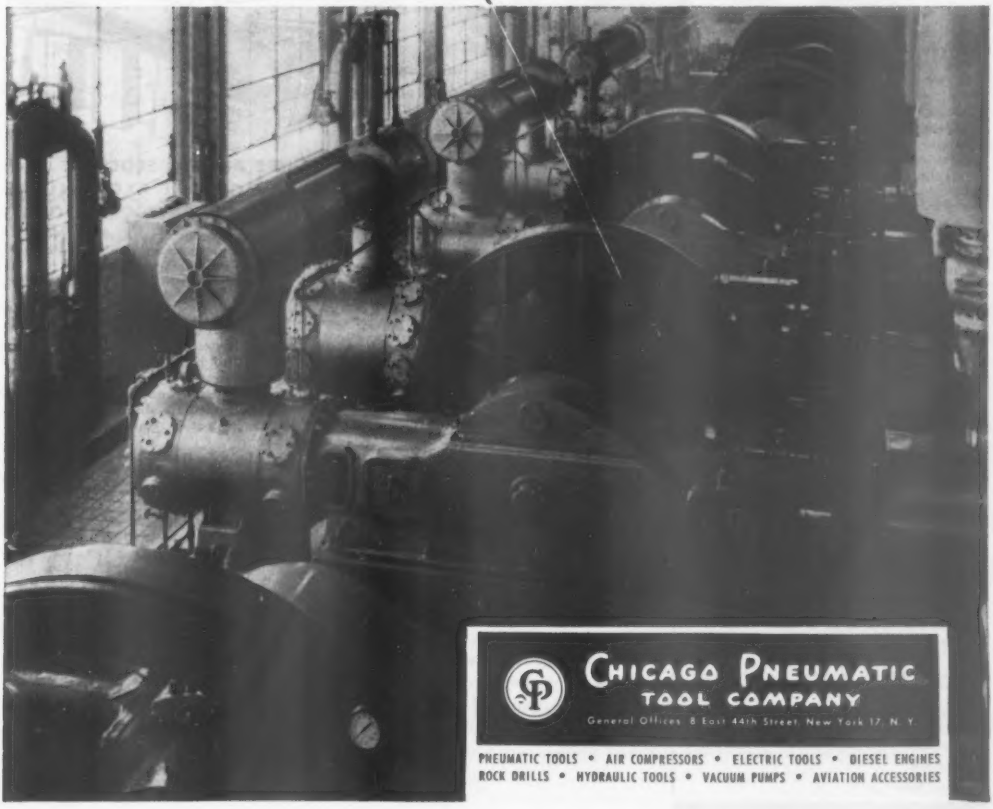
All air requirements of a big automotive plant are met by this battery of five CP horizontal duplex compressors, with a total capacity of 20,000 c.f.m. at 110 lbs. pressure.

The three Type H-DSC steam-driven and two Type O-CE motor-driven units permit a flexibility of operation that assures a dependable supply of air at all times with maximum economy.

Steam-driven compressors are particularly desirable, alone or in combination with electric-driven compressors, where exhaust steam can be utilized for process work or for heating.

CP Fiftieth ANNIVERSARY

Write for complete information



CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

PUT THE WIND TO WORK!

Allen

TURBINE VENTILATOR

Economically Removes Heated Air, Fumes, Dust

This wind-driven Allen Type "C" Turbine Ventilator, made of heavy-gauge coated iron or of special non-ferrous metals, displaces from 5,740 to 267,800 cu. ft. of air per hour, depending upon throat diameter of turbine, *at no cost*—the breezes supply the power! It's ventilation that gives maximum performance per dollar spent; economical to install and maintain, too. Helps make working conditions more comfortable, keep worker productivity high. Another type, motor-equipped Electro-Wind Turbine Ventilator, is available for use in areas where wind velocities are not always sufficient. Allen Engineered Ventilation is in use in thousands of industrial and commercial establishments.

- Representatives in principal cities are listed in our catalog in Sweet's Architectural File, Section 20b.
- Write for our catalog.

ALLEN ENGINEERED VENTILATION

PRODUCTION PLANNING CO.
ROCHESTER, MICH.
Roof Ventilators for Every Industrial Need

FILL OUT AND SEND COUPON

PRODUCTION PLANNING CO.
ROCHESTER, MICH.

Please send me informative literature on your complete line of roof ventilators.

Firm _____

Name _____

Position _____

Address _____

City, State _____

YOU MUSTN'T MISS—

Begins on page 238

TIMELY HINTS

"Give-Aways" Get and Keep Workers

Are you getting and keeping all the workers you need? If not, giving away free samples or loaning books to your people may help you attract new employees and boost morale of old ones.

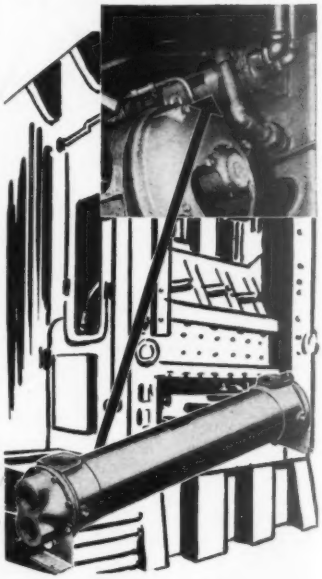
Lots of companies are using give-away items. Here are some typical ones—with their gifts—as reported in the *Wall Street Journal*:

- **Free samples of company products.** Perhaps you can't do this if you make autos. But Nestle's Chocolate Co., New York, sends each new employee a package of chocolate products with a get-acquainted letter from the company personnel director.
- **Snacks.** Mid-afternoon pick-me-ups of milk or ice cream are the order of the day at National Dairy Products Co., New York.
- **Employee publicity.** Bergstrom Paper Co., Neenah, Wis., posts photographs of new workers on company bulletin board immediately after hiring.
- **Libraries.** Westinghouse Electric & Mfg. Corp., East Pittsburgh, Pa., and General Electric Co., Fort Wayne, Ind., operate employee libraries, encourage workers to borrow from them.
- **Free meals.** Hotpoint, Inc., Chicago, follows up employee tours with a meal on the house in the plant cafeteria.
- **Thoughtful reminders.** The C. A. Norgren Co., Denver, reminds husband of wife's birthday, sends anniversary flowers and card.

Turn the page

CONTROL

HYDRAULIC FLUID TEMPERATURES!



THERE ARE 132 STOCK YOUNG HEAT EXCHANGERS TO ASSURE OPTIMUM COOLING

Young standardized shell and tube heat exchangers are quality-built to control fluid temperatures and protect costly hydraulic equipment. For example, tubes are braised to tube sheets which, in turn, are braised to the shell to eliminate leakage between hydraulic fluid and coolant. Tube and baffle spacing are engineered to provide maximum heat transfer with minimum pressure drop. Immediate shipments can be made from stock. Catalog sent upon request.

YOUNG RADIATOR CO.

Heat Transfer Products for Automotive and Industrial Applications. Heating, Cooling, and Air Conditioning Products for Home and Industry.

Dept. 802-G • RACINE, WISCONSIN

Factories at Racine, Wisconsin and Mattoon, Illinois

new.....

ready to use.....

speedy.....

3M EXTRUDED SEALERS

Here's a valuable new addition to the 3M line of automotive products . . . 3M extruded sealers.

3M extruded sealers come in a variety of sizes, ready-made for fast, hand application on your production line. 3M extruded sealers eliminate the need for pressure extruding equipment and make possible a quick, on-the-spot seal. *And*, if you need a special shape extrusion, 3M will die-cut one to your specifications!

An additional feature of some 3M extruded sealers is their expansion when heated. These sealers swell about *50% under heat* and cure to tough, rubber, gasket-like seals especially valuable when faying surfaces are irregular, and a completely tight seal is necessary. These sealers give a high degree of adhesion, and can be painted over handily.

Ask your 3M salesman to show you his line of extruded sealers . . . they are tailor made for the auto industry. Like all 3M products, extruded sealers are *engineered* for top quality and performance, ready to do a bang-up job for you! For more information about 3M extruded sealers write 3M, Dept. 37, 411 Piquette Avenue, Detroit 2, Mich.

FIFTIETH ANNIVERSARY 3M COMPANY 1902 ★ 1952

ADHESIVES • COATINGS • SEALERS

MINNESOTA MINING AND MANUFACTURING COMPANY • ADHESIVES AND COATINGS DIVISION

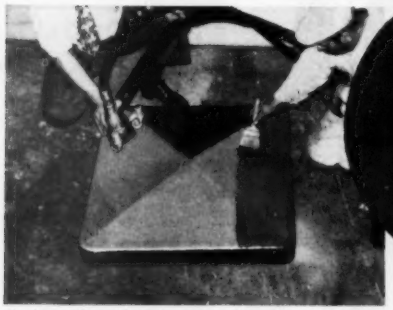
411 PIQUETTE AVE., DETROIT 2, MICH.

GENERAL SALES OFFICE: ST. PAUL 6, MINN. • EXPORT OFFICE: 270 PARK AVE., NEW YORK 17, N. Y. • IN CANADA: LONDON, CANADA

MAKERS OF "SCOTCH" BRAND PRESSURE-SENSITIVE ADHESIVE TAPES • "SCOTCH" BRAND SOUND RECORDING TAPE • "SCOTCHLITE" BRAND REFLECTIVE SHEETINGS • "3M" ABRASIVE PAPER AND CLOTH • "3M" ADHESIVES AND COATINGS • "3M" ROOFING GRANULES • "3M" CHEMICALS

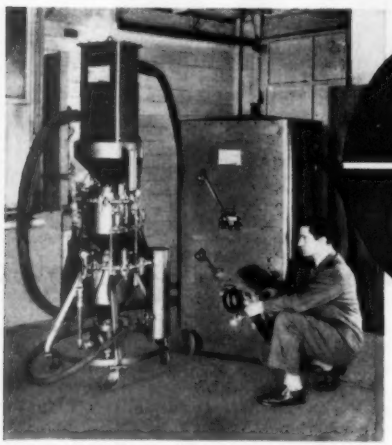
BLAST CLEANING
WITHOUT DUST OR GRIT

VACU-BLAST scours the surface, eats the dust and reclaims the abrasive — all at once!

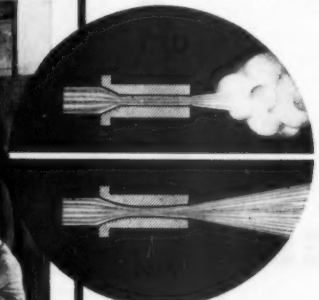


Right in the midst of your working shop, Vacu-Blast removes rust, paint and scale from metal, masonry and wood with a thoroughness and efficiency that only abrasive blasting provides. Surfaces are perfectly prepared for welding, painting or process requirements, yet there's no dust or scattered abrasive to interfere with other operations.

The abrasive, dust and debris are confined within the blast gun — they are picked up by Vacu-Blast's unique, patented vacuum return. The blasted surface is left clean and dustless. Your shop is protected from the nuisance of scattered dust and grit. Valuable abrasive is reused numerous times.



This is Vacu-Blast's working team — the blast gun — the combination generator/reclaimer, and the dust collector. All are compact, portable and easy to move around.



Newest Vacu-Blast improvement is the flared, high efficiency nozzle that does up to 25% more work per hour than previous nozzles. Developed through extensive research, the throat design of this new nozzle eliminates inefficient shock waves, resulting in full power flow of abrasive. This new nozzle is now provided on all Vacu-Blast equipment, and has been made available to all present users.

VACU-BLAST CO. INC.

Please send specific detail information applying to the _____ business

Firm _____

Address _____

Signed _____

Write for free booklet

YOU MUSTN'T MISS—

Begins on page 238

Learn to Measure Plant Productivity

"You're not ready to meet the newest trend of union bargaining strategy. And you'd better do something about it."

That, in effect, was the warning of Fisher, Rudge & Neblett, management consultants, after a survey of a cross section of industry on the so-called "increased productivity factor."

What you'll face · 43% of the companies surveyed that had union contracts reported the union had already brought up the productivity raise question. And 50% of the companies expect the issue to figure in their next wage negotiations.

Industry's Fix · Here's what the survey showed:

- 43% of the companies surveyed weren't sure what productivity meant in terms of their own company.
- 70% can't make an estimate of productivity level in their industry.
- Half the companies are opposed to the "productivity factor" clause. 43% said they didn't have enough information to say. 7% were for it.
- 75% of the companies believed a "productivity factor" clause in their labor contract would not stimulate efficiency.

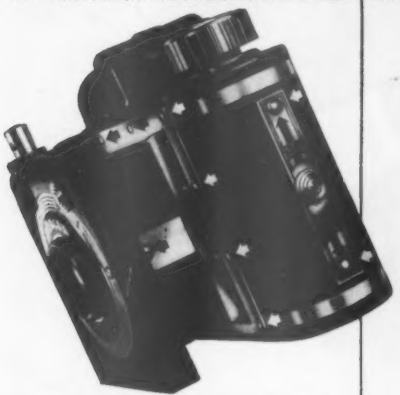
Background · The increased productivity factor can be defined as an annual increase which (in most contracts written to date) loosely corresponds to the long-term national trend of output per man-hour in all manufacturing industries.

This type of raise was first used in the General Motors-United Auto Workers contract of 1948. It guaranteed an annual wage increase of 2½% per year during the 5-year life of the contract (about 4¢ an hour per year).

Turn the page

This man can show you . . .

How to eliminate needless operations that slow up assembly hands

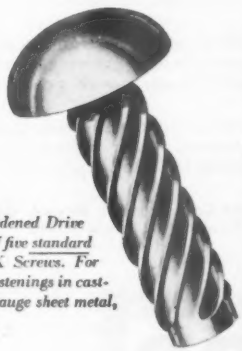


Because no tapping or inserts in plastic parts slowed production of this camera, assembly costs were greatly reduced. Sixteen P-K Type U Drive Screws were pressed into blind, untapped holes to assemble sheet metal and Bakelite parts. Two P-K Type Z Screws fasten the periscope extension box.

Ask a P-K Assembly Engineer to help you "question every fastening". He'll show you where tapping for machine screws, inserts in plastics, and awkward bolting or riveting are wasting time, boosting costs.

His experience is based on more than a million P-K applications. He can quickly determine which Self-tapping Screw, from Parker-Kalon's complete line of *standard* types, will help you make better, faster, stronger assemblies, at lower cost.

Today, more than ever, the P-K Assembly Engineer is a good man to have on your production team, helping you boost output and beat the squeeze on profits. He'll call at your request. Parker-Kalon Corporation, 200 Varick St., New York 14.



Type U Hardened Drive Screw, one of five standard types of P-K Screws. For permanent fastenings in castings, heavy gauge sheet metal, and plastics.

Your INDUSTRIAL SUPPLY DISTRIBUTOR . . . *your local source for P-K Screws—works side by side with the P-K Assembly Engineer. Their combined efforts are solving many difficult problems of planning and procurement. Let them help you.*

P-K TRADE MARK REG. U.S. PAT. OFF.

PARKER-KALON®

The Original **SELF-TAPPING SCREWS**

FOR EVERY METAL AND PLASTIC ASSEMBLY

ARO AIR TOOLS

help Electrolux bring Costs Down!

Aro Screwdriver, Model 7107, in vacuum cleaner assembly work at Electrolux plant, Old Greenwich, Conn.

Lever-throttle Aro Screwdrivers with adjustable clutch drive screws to correct torque for Electrolux.

Today's need for SPEED to reduce costs in assembly and to reduce operator fatigue brings growing demand for ARO Screwdrivers and Nutsetters with power at your fingertips!

Try 'em . . . compare 'em for lightness, speed, power and endurance . . . for continuous high production! Wide range of models and speeds for many applications. Write for new catalog 60.

The Aro Equipment Corporation, Bryan, Ohio.
Aro Equipment of Canada, Ltd., Toronto, Ontario.

SEND

THE ARO EQUIPMENT CORPORATION,
BRYAN, OHIO

Without obligation please send the new ARO tool catalog No. 60

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Company.....

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ARO AIR TOOLS

Also . . . LUBRICATING EQUIPMENT . . .
HYDRAULIC EQUIPMENT . . . AIRCRAFT
PRODUCTS . . . GREASE FITTINGS

YOU MUSTN'T MISS—

Begins on page 238

Pay Survey Shows You've Lost Since '39

Chances are you're making less money now—in real pay—than you did in 1939. Arch Patton of McKinsey & Co., New York, management consultants, made a study of employee pay changes in 41 major corporations since 1939, and shows how:

Salaried and hourly workers are making 3% more real pay than in 1939. They're the only ones that made enough since 1939 to offset higher prices and taxes. Average yearly salary rose from $1650 to $3400.

The foreman has dropped 13% in real pay, though he receives 83% more dollars.

Middle management took a cut of 40%, even with a pay hike of 45%—$15,200 today as against $10,500 in 1939.

Top management has taken the biggest drop in real pay—59%—though averaged pay increased from $43,700 to $59,300.

Checklist for New Plant Location

Here's the inside story on how Westinghouse Electric Corp. selects new plant locations. According to Gwilym A. Price, company president, a desirable location has:

- Adequate labor supply.
- Fair labor rates, with low turnover.
- Good sites on railroads and highways at reasonable rates.
- Great enough size to absorb worker families.
- Good schools, many churches.
- Good shopping facilities.
- Freedom from debt.
- Water, gas, and sewage lines available at the property line.
- Local vocational schools.
- Plans for attracting new industry to fit community needs.
- Real desire to have company.

Turn the page

with **THE MULTI-CLEAN METHOD!"**

"Keeping our floors sealed with Multi-Clean Concrete Preserver holds dust to a minimum throughout the plant and makes them easier to keep clean and sanitary," says the floor maintenance director of Griggs, Cooper and Company, large mid-western food processing firm.

"Daily sweeping time has been cut at least one-third because heavier dirt doesn't stick to the hard, smooth finish, and dust sweeps up easily. Moisture, too, is prevented from penetrating the floor surface, and makes it impervious to alkalies, grease, acids, etc.

"In our spice and baking powder rooms, dust is extremely fine and hard to sweep up. Here we use the Multi-Clean industrial vacuum which gives us an efficient and dust-free operation.

"We wet mop all our concrete floors once or twice a week and buff them once a month with a fine steel wool disc under a Multi-Clean floor machine to loosen any stubborn dirt and restore the finish. Multi-Clean Concrete Preserver is applied every 6 months to a year, depending on traffic conditions.

"With the Multi-Clean Method of floor care, our concrete floors are kept in better condition to stand the rigorous traffic they get every day. Then, too, they're always clean and attractive, and repairs and replacements are practically non-existent."

Multi-Clean Concrete Preserver

Multi-Clean Floor Machine

Multi-Clean Wet-Dry Vacuum

Every Multi-Clean product carries a 100% guarantee.

MULTI-CLEAN®
PRODUCTS, INC.

free! FLOOR MANUALS
Each for the proper care of a specific floor. Check the coupon for the manuals of your choice.

MULTI-CLEAN PRODUCTS, INC.
2277 Ford Parkway • Dept. FM-7, St. Paul 1, Minn.
Gentlemen—I would like to know more about the Multi-Clean Method for my floors. Send manuals I have checked.
☐ Asphalt Tile ☐ Concrete ☐ Rubber Tile
☐ Wood ☐ Terrazzo ☐ Linoleum
☐ 9-Job Floor Machine ☐ Wet-Dry Vacuum
☐ All-Purpose Scrubber
Name and Title
Company
Address
City Zone State

Boy....

am I glad we use

DUFF-NORTON JACKS

for Heavy Lifting Jobs!

WHY?

Because they're easy to Operate
They're Fast ... Safe
and always Dependable

No. 2825

You should have one or more Duff-Norton Jacks in every department of your plant to save you time, effort and money. "Get that Duff-Norton Jack," will become a familiar phrase when heavy lifting, lowering, pushing or pulling jobs are to be performed. The Governor-Controlled Jack shown will raise 25 tons with ease and maximum safety . . . keeps men fresh for repair work. Other capacities range from 3 to 100 tons . . . providing a Duff-Norton Jack for every industrial application. See our complete line . . .

Write for Catalog 203-J

THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO 6, ONT.

"The House that Jacks Built"

YOU MUSTN'T MISS—

Begins on page 238

How Many Alcoholics in Industry?

Chances are, not as many as you thought there were day after New Year's. A survey of 433 manufacturing companies, each employing more than 500 workers, showed that 84% didn't even consider alcoholism to be important.

In detail, here's how the replies stacked up to questions by Opinion Research Corp., Princeton, N. J.:

How many chronic alcoholics do you have? The average figure was less than ½ of 1%. This was true even for those who believed that fellow employees try to cover up for the alcoholics.

How do you define chronic alcoholism? More than half called it "inabiity to leave alcohol alone; compulsive drinking; uncontrollable drinking."

Is social drinking a problem? No, said 90% of the companies.

Is alcoholism an important cause of absenteeism? It ranked last as a cause of absenteeism.

How many days per year would you say each of the chronic alcoholics lose from work? On the average, about 20 days.

Want a copy of the report? Write Licensed Beverage Industries, Inc., 155 E. 44th St., New York 17.

Latest Styles for Plant Guards

On duty, the average plant guard is a well-dressed, well protected fellow. That bit of news comes from Associated Industries of Cleveland after its survey of 16 Cleveland plants employing 1000 or more workers. The results:

Uniforms · Every plant required them for day-shift guards. Not so for the night watchmen, though. Plants issue coat, pants, hat or cap in all but one case. All but one company issued the shirts

FACTS YOU SHOULD KNOW ABOUT THE

comfort features

OF PITTSBURGH CORNING GLASS BLOCKS

QUESTION . . . What kind of glass should we use in window openings to keep workers happy and comfortable?

ANSWER . . . Specify PC Glass Blocks—because they help maintain cleaner working areas, effectively eliminate drafts, and provide best natural lighting for maximum eye ease. Our men are available to help you with your problems, without obligation on your part.

In plants, factories and buildings of all types, management has proved that PC Glass Blocks contribute to increased worker comfort and efficiency. This is because PC Glass Blocks make the most of daylight, admitting an abundance of natural, controlled daylighting, with more eye-comfort than possible with conventional windows.

Moreover, the excellent insulating properties of PC Glass Blocks—more than twice those of ordinary single-glazed windows—help immeasurably to keep interiors cooler in summer and warmer in winter. Being non-transparent, they assure complete privacy, shut off distracting views. They reduce noises, stop the infiltration of harmful dust and grit. And where high humidity is present, PC Glass Blocks are ideal. For moisture will not condense on the room side of glass block panels, except under extreme conditions.

Why not investigate what PC Glass Blocks can do in your buildings—in better employee comfort as well as in actual savings in operations and in product improvement? The coupon will bring you complete information.

Other Facts: PC Glass Blocks reduce heating and air-conditioning costs; they seldom need repairs or replacements; they involve no periodic painting, puttying and caulking; they offer better protection against intruders and vandals; are immediately available.

Mail this coupon for complete information

PITTSBURGH PC CORNING ®

Pittsburgh Corning Corporation
Dept. P-72, 307 Fourth Avenue
Pittsburgh 22, Pa.

Please send me a copy of your FREE booklet, "The Mark of a Modern Building—PC Glass Blocks."

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Address.....

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PITTSBURGH CORNING CORPORATION • PITTSBURGH 22, PA.

PALMETTO CUTNO® and a DeLaval IMO

team up to resist caustic bite for American Viscose Corp.

In the busy Nitro, W. Va., plant of American Viscose Corporation alkalis behave when Palmetto and DeLaval are called upon for service.

A DeLaval Rotary Pump — type IMO — packed with Palmetto Cutno handles caustic soda — carbon bisulphide at 55 F, and 95 psi at variable speeds between 178-355 rpm. A great pump and a great packing mated for efficient economical operation.

Palmetto Cutno, the *standard* anti-alkali packing, resists caustics in all concentrations — all temperatures. Its special lubricant-compound cannot "soap out" because it does not saponify . . . and like in all other Palmetto Self-Lubricating Packings, each individual strand is impregnated with the lubricant *before* the packing is constructed.

Write for PC-101 . . . the catalog that describes all Palmetto Packings in detail.

PALMETTO Packings

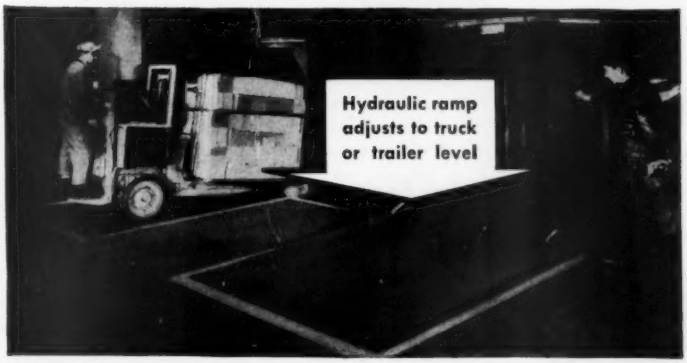
packing more performance into every application

GREENE, TWEED & COMPANY

NORTH WALES, PENNSYLVANIA

NEW **ROTARY LEVA-DOCK**

doubles loading dock capacity



Mechanize your loading dock

The new Leva-Dock travels up or down to permit loading directly into or unloading from all types of trucks or trailers . . . without using steel plates, bridge ramps or other slow and often dangerous methods.

This hinged ramp is positioned by a hydraulic jack. Retractable supporting arms and laterally adjustable throw-over bridge connect the ramp and truck bed. Platform automatically travels up or down as truck springs are compressed or relieved.

Capacities 5,000 through 20,000 lbs. Scientifically engineered, ruggedly built, powered by famous Rotary hydraulic jack. Simple to install and inexpensive to operate.

For catalog on the new Rotary Leva-Dock, write

ROTARY LIFT COMPANY, 1153 KENTUCKY, MEMPHIS 2, TENN.

YOU MUSTN'T MISS—

Begins on page 238

that go with them. Thirteen of the 16 companies supply raincoats and boots for bad weather. one doesn't issue raincoats, and the other two require the guard to pay for his own boots.

Styles · Dark blue single-breasted suits are predominant. Some plants switch to light shades of blue and gray in summer.

The Extras · All but one of the plants issued Sam Browne belts. All provided badges. Guards at 11 of the plants carried pistols.

Cleaning Bills · In 10 companies the employee pays them. One company pays cleaning expenses for clothes soiled in the line of duty, such as while putting out a fire. Five companies clean guards' clothes.

Replacement · In all but the one company that does not issue uniforms, there are programs of replacement for uniforms.

Reports on Industry Now Available

Want to know what British experts in your field had to say about your industry after making detailed studies over here? Just take a peek at the reports made by the productivity teams that visited U. S. industries under the sponsorship of the Anglo-American Council on Productivity.

The reports have already proved to be of great interest to American industry. Each has the unanimous endorsement of the team members. Included are recommendations to British industry of ways to increase productivity based on what was learned on the many team visits to the United States.

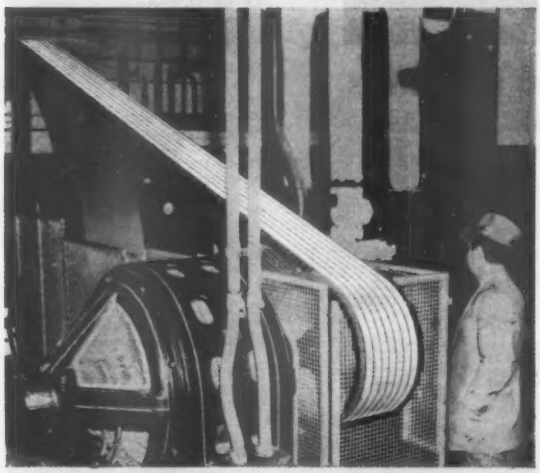
Here's a list of available reports. List the titles of the ones you want, together with the order number opposite. Make out your check to the Treasurer of

How concave sides cut V-Belt costs

Important to anyone who wants to cut V-Belt replacement costs is the simple, interesting reason WHY Gates Vulco Ropes are built with *Concave Sides* (U. S. Patent 1813698). See Figure 1.

When a Gates belt is bent around a sheave these Concave Sides fill out to full, even contact with the sides of the sheave groove. (Figure 1A). This gives you sure pulling power. And, naturally, because wear is distributed evenly, the Concave Sides actually give you longer wear—longer belt life. That cuts V-Belt replacement costs.

On the other hand, when a straight sided V-Belt (Figure 2) is bent, the sides bulge out, preventing the belt from fitting evenly in the sheave groove. This causes *extra wear* at the points shown by arrows. (Figure 2A).



Make this simple test yourself...

Hold a straight sided V-Belt as it would be bent around a sheave. Take the sides of the belt between your finger and thumb. You can *feel* the bulges in the sides—the bulges that prevent an even fit in the sheave groove and cause extra wear.

Now do the same thing with a Gates Vulco Rope. You can feel the sides fill out. You can see why they press firmly and evenly against the sides of the sheave groove—giving you longer belt life—lower belt costs.

When you buy V-Belts be sure to get Gates Vulco Ropes—the V-Belts with the Concave Sides.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

SAVING $1,000 A YEAR

This big 18 foot flywheel on an ammonia compressor at the Terminal Warehouse Co., St. Joseph, Missouri, was originally driven by a flat belt.

Mr. I. McKee, plant superintendent says, "We needed a drive we could depend on, so we installed a Gates Vulco Rope drive right on the flat pulley of the compressor. This conversion is saving us about $1,000 a year."

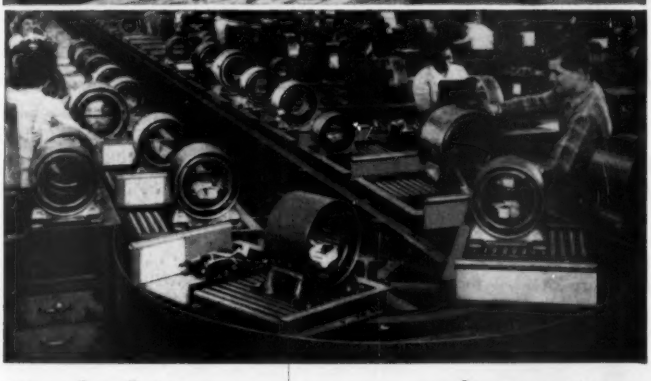
CS-526-A

Gates® VULCO® ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

V-Belts — Hose
Molded Rubber Goods
for industry
World's Largest Maker of V-Belts

IF YOU HANDLE OR ASSEMBLE MANY PIECES—PARTS—UNITS—ITEMS—ARTICLES—AS PART OF YOUR PRODUCT...



Standard Conveyors can speed operations

Keeping things moving — avoiding "bottle-necks" — on production, assembly, processing or packaging lines can be done better, faster, and cheaper *mechanically* with conveyors.

Your needs in conveyors — ranging from power and gravity conveyors, roller, belt, slat, chain, push-bar, sectional — to portable, self-contained conveyors — spiral chutes — pneumatic tube systems — can be met at Standard, with a conveyor experience record of more than 45 years. Write — Address Dept. FM-72.

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul, Minnesota
Sales and Service in Principal Cities

Write Dept. FM-72 for Standard's General Catalog and tell us what you want to convey.

ROLLER • BELT • SLAT • CHAIN • WHEEL
PUSH-BAR • SECTIONAL
PORTABLE CONVEYOR UNITS:
HANDIBELT • HANDIPILER
INCLINEBELT • LEVEL BELT • EXTENDOVEYOR
UTILITY BELT-VEYOR • HANDI-DRIVE
VERTICAL LIFTS • PNEUMATIC TUBE SYSTEMS

YOU MUSTN'T MISS—

Begins on page 238

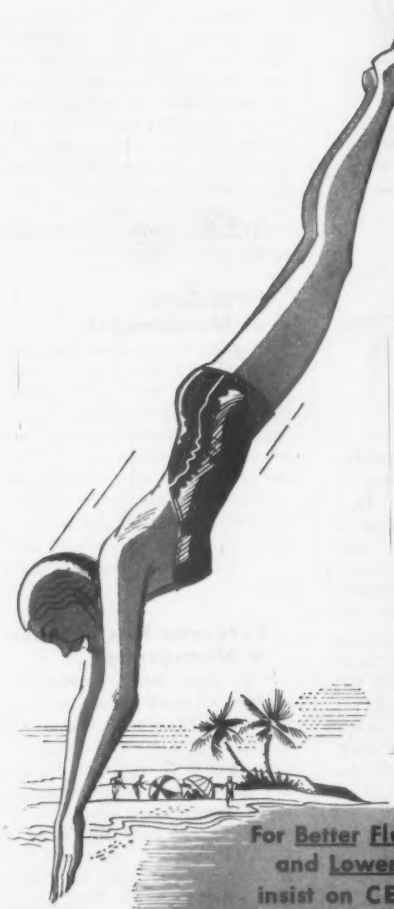
the United States. Mail the order and check to Office of Technical Services, Department of Commerce, Washington 25, D. C.

Order No.	Title	Price
PB 106409	Brass foundry	$1.70
PB 106410	Diesel locomotives	.75
PB 106411	Electric motor control gear and small airbrake switchgear	.50
PB 106412	Gray ironfounding	.90
PB 106413	Hot dip galvanizing	.90
PB 106414	Internal combustion engines	.65
PB 106415	Meat packaging, processing	1.00
PB 106416	Lithographic printing	1.25
PB 106417	Footwear	2.25
PB 106418	Letterpress printing	.65
PB 106419	Men's clothing	.75
PB 106420	Metal finishing	.90
PB 106421	Non - ferrous metals	1.15
PB 106422	Pharmaceuticals	.75
PB 106424	Rigid cartons & boxes	.50
PB 106425	Saving scarce materials	.50
PB 106426	Unions & productivity	.65
PB 106427	Training of workers	.75
PB 106428	Training of supervisors	.65
PB 106429	Universities & industry	.65
PB 106430	Valves	.90
PB 106431	Welding	.90
PB 106432	Education for management	1.15
PB 106433	Brushes	.65
PB 106434	Hosiery & knitwear	.75
PB 106435	Coal	.90
PB 106436	Packet foods	1.15
PB 106441	Electrical supply	.90
PB 106442	Superphosphate & compound fertilizers	.75
PB 106443	Freight handling	.65
PB 106444	Hop industry	2.15
PB 106445	Management accounting	.50
PB 106446	Materials handling	.65
PB 106447	Packaging	.65
PB 106449	Productivity measurement in British industry	.50
PB 106451	Simplification in British industry	.30
PB 106454	Furniture	1.15
PB 106455	Cakes & biscuits	1.15
PB 106456	Food canning	1.70
PB 106457	Fruit & vegetable utilization	1.00

Turn the page

Fluorescent Maintenance COSTS DIVE

when you use Certified Starters



CERTIFIED STARTERS reduce your fluorescent lighting costs in two ways:

1. They assure full life for the lamps.
2. They are made to provide at least 36,000 starting operations.

CERTIFIED STARTERS thus cut your maintenance costs as well as increase your overall lighting satisfaction.

CERTIFIED STARTERS do this because they are made to precise specifications drawn up to meet the particular starting requirements of the fluorescent tube. They are then tested by Electrical Testing Laboratories, Inc., which certified they meet these rigid manufacturing specifications.

For Better Fluorescent Performance and Lower Maintenance Costs insist on CERTIFIED STARTERS.

Certified Fluorescent Starter Manufacturers

2116 KEITH BUILDING • CLEVELAND 15, OHIO

NOW

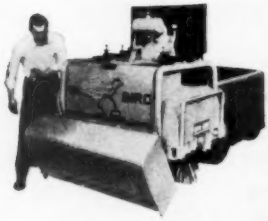
YOUR LIFT TRUCK CAN SWEEP 100,000 SQ. FT. PER HOUR!

The YARD BIRD BY LITTLE GIANT

This low-cost POWERED SWEEPER FITS ALL *Fork Lift* TRUCKS!

See your lift truck dealer for a demonstration

LET US RUSH YOU COMPLETE DETAILS



Once you see prices and literature on the "Yard Bird," the quality construction specifications will surprise you — at this low cost. Note (above) how easily the floating dust pan is dumped, how your regular lift truck operator becomes your "Yard Bird" operator; no extra skills required. You won't be satisfied with your present methods after you see the "Yard Bird" in low-cost operation.

YOUR FORK LIFT TRUCKS can be quickly adapted to fast, large-area sweeping — indoors and out — with the new "Yard Bird" sweeper. Powered, containing its own sprinkler, it attaches to lift truck in minutes' time for use in factories, warehouses, airports, aircraft plants, railroads, stevedoring companies, etc.

This inexpensive sweeper unit covers 100,000 sq. ft. per hour (with truck traveling at 5 m.p.h.). Rugged 6.8 HP gasoline engine provides 2,400 RPM; integral clutch reduction unit keeps brush revolving at 164 RPM. FOR SNOW REMOVAL, simply adjust unit to 15 degree angle and snow is whipped off to one side!

Consider the man hour savings, initial investment savings, when you equip with the "Yard Bird"!

LITTLE GIANT PRODUCTS, INC.

DEPT. 20, 1530 NORTH ADAMS STREET, PEORIA, ILLINOIS

YOU MUSTN'T MISS—

Begins on page 238

QUOTES

Equip Foremen to Communicate

"If we are to expect the American foreman to be a communicator he must appreciate the need for it, feel the necessity of it insofar as his job is concerned, and be provided the tools of education, training, and information which give him the courage and assurance to perform the task." — *T. O. Armstrong*, Director, Plant Labor Relations, Westinghouse Electric Corp.

First Duty of Management

"I consider that operating profitably is the first duty of management for the simple reason that without profit there is no incentive to business growth and expansion, no reward to call forth the best efforts of employees, and therefore no reasonable expectation of the fullest utilization of our . . . resources."—*Paul Hoffman*, President, Ford Foundation.

Everyone Has a Stake in Management

"We have done a tremendous amount of work in the last few years in talking with supervision and trying to convince supervision that it is management and that it is a part of the management team.

"All this is good. We must go a lot farther, however, and take it out to the man on the bench and convince him that he too has a stake in management."—*Robert E. Gross*, President, Lockheed Aircraft Corp.

Turn the page

Cut the costly excess . . . with Pure Oil Industrial Lubricants

In the complete line of high-quality industrial lubricants Pure Oil makes, you will find many oils and greases designed to do several *different* jobs, instead of one specific job.

And to do each job *equally well.*

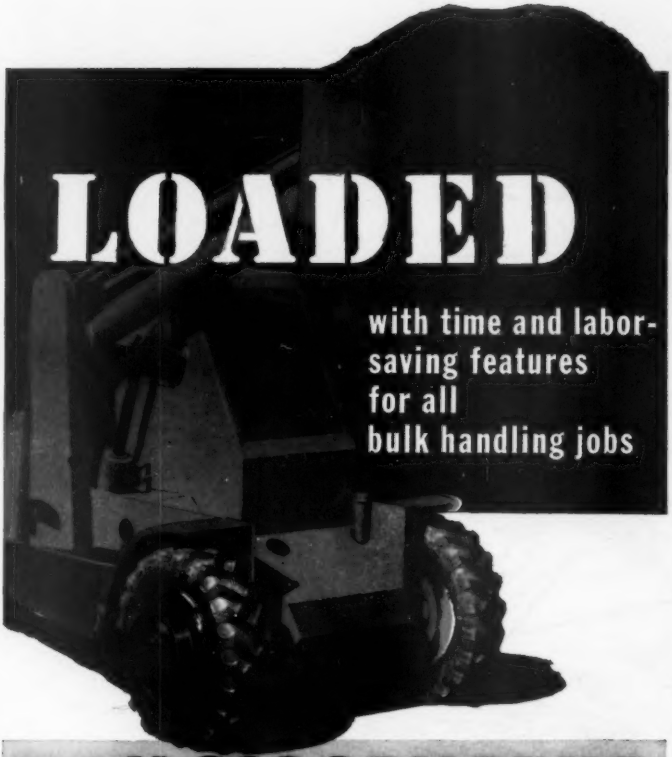
This makes it possible for you to do *all* your lubricating with *fewer* lubricants. In other words you can

simplify and save...with Pure Oil Industrial Lubricants

If reducing your lubricants inventory would help reduce your costs (and don't you think it should?), write for full details to: The Pure Oil Company, Industrial Sales, 35 East Wacker Drive, Chicago 1, Illinois.

THE PURE OIL PURE COMPANY, U.S.A.

Be sure with Pure



model H SCOOPMOBILE
FULL HYDRAULIC FRONT END LOADER

Solve bulk handling problems in a hurry. Cut costs and accidents in stockpile yards with the full-hydraulic SCOOPMOBILE front end loader.

Every "bite" is a bulging bucketful that can't spill...the scoop stays level throughout its fast cycle from scooping to dumping position. A single sturdy hydraulic elevating arm permits clear-vision control by operator in safety cab.

Ruggedly built for hard work, the Model H SCOOPMOBILE shovels, transports and loads sludge, sand or coarse materials with equal ease. Three-wheel maneuverability with power steering gives peak operating performance. Quick-change attachments increase versatility.

- Standard ¾ cu. yd. bucket scoops chassis-width track.
- Rated load lifting capacity, 4,000 lbs.
- Standard discharge height to 8 ft.
- Heavy duty industrial engine and planetary drive axle with 3 to 1 reduction ratio gives ample reserve power.
- Can be driven at speeds to 20 m.p.h. and towed from job to job.
- Quick-change attachments include: Swivel type concrete hopper. Lift forks. 5-ft. crane boom.

EXTRA-LOW IN INITIAL COST . . . EXTRA-HIGH IN EFFICIENCY

Write for literature and name of your nearest SCOOPMOBILE dealer

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TELESCOPIC LIFT • STATIONARY TOWER

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YOU MUSTN'T MISS—

Begins on page 238

"An executive has very little time . . .

. . . to think of how a job could be done better because he's too busy getting the job done."—*Alfred P. Sloan,* Chairman of the Board, General Motors Corp.

Sound Control in Industry

"In new construction, it is as vitally important to consider sound control as it is to design good lighting, plumbing, and air conditioning for increased efficiency and better working conditions.

"This can be accomplished by consultation with an acoustical engineer who can suggest machine location and office location and pre-determine what use should be made of acoustical materials.

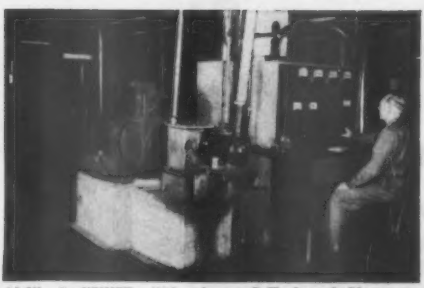
"Assume, however, that the plant is already built and management recognizes a serious noise problem and wishes to control this condition. What then are the necessary steps?

"First a survey of the problem should be made by a person experienced in acoustical analysis. This should include a discussion with management plus inquiries of the workers to obtain their impression of the noise sources. Depending upon the type of noise and the specific problem, it may or may not be necessary to take measurements with sound level instruments. Part of the misconception concerning acoustical problems is the illusion that one kind of treatment can be a cure all. After an analysis has been made—it can then be determined how the noise can be either eliminated, isolated, or reduced by absorption through acoustical treatment." *B. F. Leaman,* Manager, Sound Control Products, Owens-Corning Fiberglas Corp.

Turn the page

GENERAL MILLS, INC. picked G-E *Thy-mo-trol** drives to proportion and control flow rate of flour. They wanted stepless, very accurate, electronic speed control over a wide range, plus quick, easy operation. The answer: *Thy-mo-trol*, available in ranges to 100:1 and more, ¼ h.p. and up. Above, operator gets orders over phone, sets drive speed quickly by turning dial.

Why four plants chose four different G-E Adjustable-Speed Drives!



JACK & HEINTZ, INC. chose G-E *Speed Variators* because they wanted to increase production with rotating, adjustable-speed drive that could be operated from centralized control—still maintain good quality over a wide speed range.

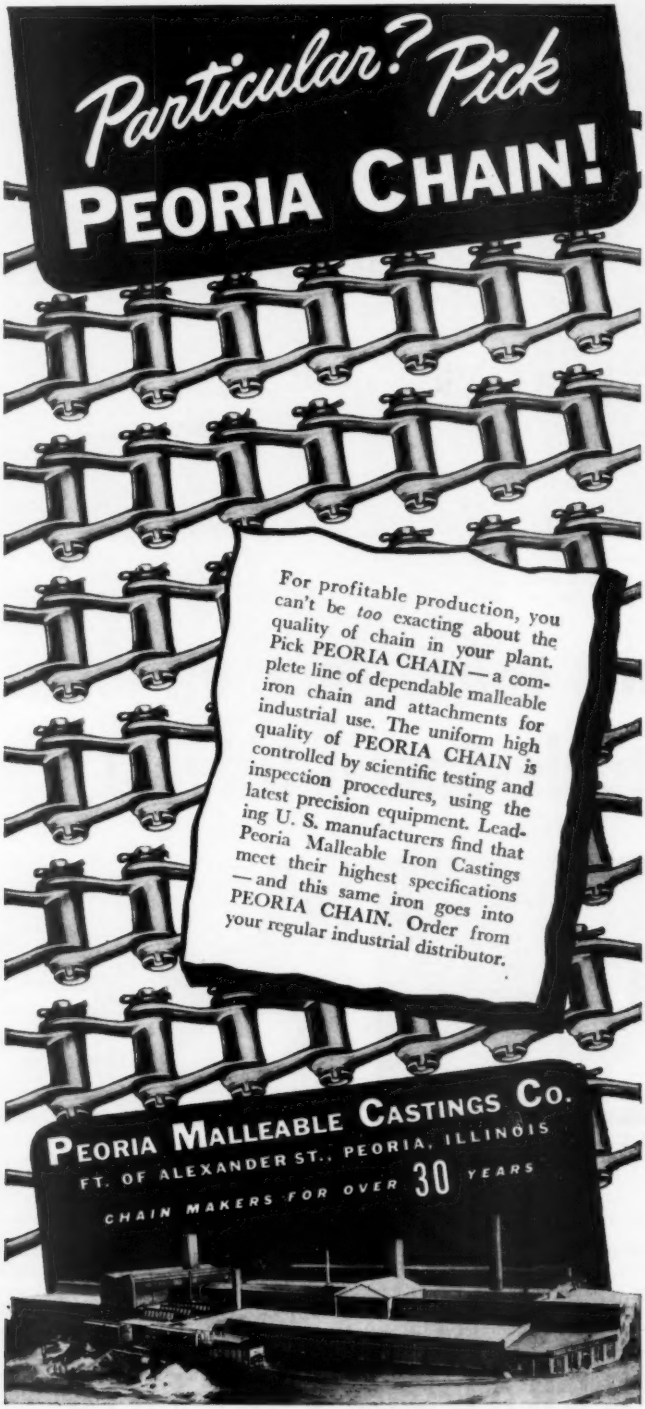
◀**BUTTERICK CO. INC.** found G-E *ACA Motors* ideal for varying speeds over moderate range for offset presses. Here is the simplest, low-cost way to get stepless, adjustable-speed drive with a-c power, contains motor, control in one compact unit.

*Reg. Trade-mark of General Electric Co.

CRANE & CO., manufacturers of fine paper, selected G-E *Electronic Speed Variators* for paper machines—needed a 40 h.p. adjustable-speed drive that maintained rigid quality control, automatically, 24 hours a day, six days a week.

GENERAL ELECTRIC CO. is the only manufacturer making *all major types* of electric adjustable-speed drives to help you speed output, raise quality. Write for 24-page *Bulletin GEA-5334. General Electric Co., Schenectady 5, N. Y.* 646-18

GENERAL ELECTRIC


Particular? Pick
PEORIA CHAIN!
For profitable production, you can't be too exacting about the quality of chain in your plant. Pick PEORIA CHAIN — a complete line of dependable malleable iron chain and attachments for industrial use. The uniform high quality of PEORIA CHAIN is controlled by scientific testing and inspection procedures, using the latest precision equipment. Leading U. S. manufacturers find that Peoria Malleable Iron Castings meet their highest specifications — and this same iron goes into PEORIA CHAIN. Order from your regular industrial distributor.
PEORIA MALLEABLE CASTINGS CO.
FT. OF ALEXANDER ST., PEORIA, ILLINOIS
CHAIN MAKERS FOR OVER 30 YEARS

YOU MUSTN'T MISS—

Begins on page 238

Servomechanisms in Future Factories

"The field of materials handling is one where the servomechanism might prove very useful and flexible. In the factories of the future strong emphasis will undoubtedly be placed on rapid changeover and flexible multipurpose equipment. A materials handling unit programmed from a tape recording might be practicable. When changeover occurs, it would merely be necessary to provide a new tape, together with possible new materials handling attachments.

"There is undoubtedly a considerable gap between the completely automatic factory of the future and our present-day factories. Our factories today comprise people and machines. To what extent and when the human element can or should be eliminated in setting up an automatic factory is a complex problem. The proper blend of formal engineering, human engineering, and economics should be employed to best meet the required long- or short-term objectives." — *Julius Y. Kaplan,* Head of Servo Section, Arma Corp.

What You Can Do With Atom Power

"I suggest to you we should never lose sight of the truth that the fact of fundamental importance about atomic energy in 1952 is that we *can* produce in *practical* quantities fissionable materials, every pound of which will give off the energy or heat equivalent of over 1000 tons of coal. And I say, when you can hold in the palm of your hand one thousand tons of coal that is something fundamentally new and potentially of real significance." —*Dr. C. J. MacKenzie,* President, Atomic Energy of Canada, Ltd.

Turn the page

EXCLUSIVE FEATURES MAKE MOBILIFT BEST!

✔Lev-R-Matic Drive

Grouped 2-way PUSH-PULL levers give instant, finger-tip control . . . forward, back, elevating, and tilting. MOBILIFT multiple disc clutch insures smooth, positive action...THERE ARE NO GEARS TO SHIFT!

✔Mobil-Chain Lift

Controlled power, roller-chain-operated lift allows unobstructed view between uprights.

✔Mobilift's 3-Cylinder Heavy Duty Engine

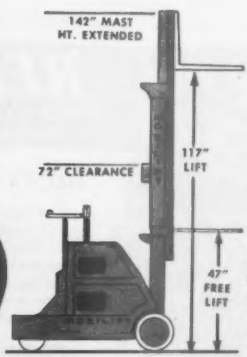
Air-cooled, compact, well-balanced and operates smoothly for long trouble-free service.

the MOBILIFT 6<10

FORK LIFT TRUCK

- **117" Lift...Floor-to-Forks**
- **72" Clearance**
- **47" Free Lift**

MOBILIFT'S *"SIX-TEN"* solves a big problem when you need a fork-lift truck with *LOW* clearance and *HIGH* lift! The "SIX-TEN" gives you a *six* foot clearance and virtually a *ten* foot lift...floor-to-forks. The MOBILIFT "SIX-TEN" easily enters truck bodies and low clearance doors, yet *tiers 3 pallets high* . . ."SIX-TEN"— from 6 feet *low* to 10 feet *high*...floor-to-forks!



The "SIX-TEN" MAST is available on the versatile Model "E" 2,000-lb. capacity (outside turning radius, 57"; turns in inter-aisles, 53"; width overall, 33"; length, less forks, 64"), and also on the EW-2,500-lb. capacity.

The H (3,000-lb. cap.) and HW (3,500-lb. cap.) models with "SIX-TEN" mast have a **110"** lift floor-to-forks, **72"** clearance, **45"** free lift.

WRITE TODAY FOR COMPLETE SPECIFICATIONS

MOBILIFT Lev-R-Matic DRIVE

MOBILIFT CORPORATION

835 S. E. MAIN ST., PORTLAND 14, OREGON

2317 W. 18th, Chicago • 790 Patterson Ave., E. Rutherford, N. J. • 2724 Taylor St., Dallas

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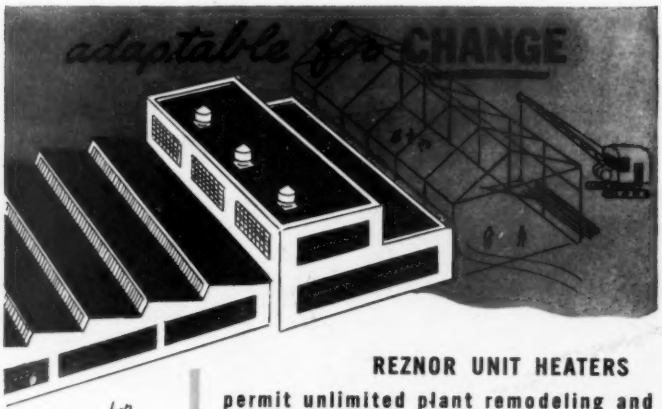


You plan for plant efficiency

If heating straight jackets flexibility

You'll be interested in a Reznor system

REZNOR UNIT HEATERS

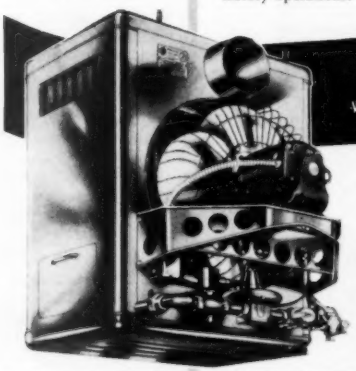
permit unlimited plant remodeling and rearrangement of factory equipment

Now, more than ever, you want to be able to change your plant set-up quickly.

Don't be handicapped by fixed restrictions within the walls of your plants. Heating can be restrictive . . . unless you use Reznor gas unit heaters. With Reznors you are not handicapped by fixed capacity as with central heating. With Reznors you don't have to build heat in a big system for a few degrees of heat nor are you frozen to specific heat distribution locations.

With Reznor you add units when and where you want them; add a wing without concern to present heating facilities; remove heat use from an idle bay and not upset a heating system; locate and relocate unit to put heat impact where wanted.

Reznors cost less to install in dollars, time and structural changes. Reznors are incomparably suited to today's flexible factory operations.



REZNOR

WORLD'S LARGEST SELLING GAS UNIT HEATER

MECHANIZED HEATING

A completely automatic, packaged unit in sizes from 25,000 to 200,000 BTU. Installed singly or in multiples as required. High efficiency due to balanced engineering of heat production, air movement and controls. Both floor and suspended models available.

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Send me 20-page catalog in full color

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Firm_____

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City_____ Zone_____ State_____

YOU MUSTN'T MISS—

Begins on page 238

The Price of Pollution

"Pollution has been a part of the price we have paid for an industrialized society capable of supplying us with a high and ever-rising standard of living. . . .

"The peasant villages of central Europe are, perhaps, free of smog, just as they are free of bathtubs, Chevrolets, and electric refrigerators.

"We cannot expect that the air of Pike's Peak can ever be transplanted to downtown New York. . . . Practical abatement, however, is well within reach of most industries.

"Enlightened managements today are trying to face the problem before it becomes a problem, and they are enlisting every contribution of modern science in doing so."—*Henry B. du Pont*, Vice President, E. I. du Pont de Nemours & Co., Inc.

Research Leads to Practical Ends

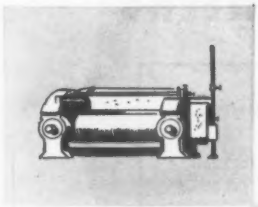
"There is no scientific investigation, however remote from industrial requirements, which might not lead to industrially useful developments." — *Charles P. Steinmetz.*

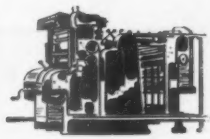
"We believe the American way of life . . .

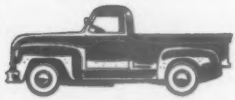
. . . cannot be sold to employees any more effectively than by a sincere, intelligent effort to provide objective information in connection with the operation of that particular company.

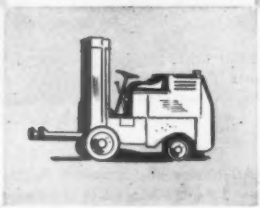
"Therefore we decided not to teach basic economics as a subject. It is our belief that if our employees have confidence in the company, they will have confidence in the system under which it operates."—*Dennis V. Ward*, Overseas Employee Relations Advisor, Standard Oil Co. of New Jersey.

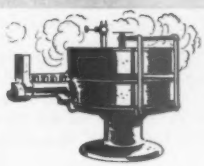
FACTORY LUBRICATION NOW SIMPLIFIED











One multi-purpose barium-base grease does work of many different greases

There's a remarkable grease now available for the lubrication of factory equipment. It's called UNOBA, and was developed by Union Oil Company in answer to the need for *one* grease that could replace a variety of single-purpose greases.

Multi-purpose UNOBA provides superior lubrication protection. For UNOBA is a barium-base grease especially designed to withstand *severe* moisture and temperature extremes.

UNOBA protects bearings against corrosion and rusting. Because of its remarkable ability to stay put, it minimizes dripping and leakage. In addition, UNOBA's lubricating film handles the toughest shock loads and insulates against bearing friction.

UNOBA'S versatility reduces your grease inventory to a single product. In some factories, this *one* grease has replaced as many as *seven* specialized lubricants. UNOBA means smaller storage space, less chance of using the wrong lubricant, lower maintenance and repair costs. UNOBA means *dollars in savings to you.*

Write to your nearest Union Oil Company office for further information on multi-purpose UNOBA grease.

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LOS ANGELES, Union Oil Building CHICAGO, 1612 Bankers Building
NEW YORK, 4904 RCA Building CINCINNATI, 2111 Carew Tower Bldg.
NEW ORLEANS, 917 National Bank of Commerce Building

Developed by the manufacturers of T&X—the amazing purple heavy-duty motor oil

76 UNION OIL COMPANY OF CALIFORNIA

An Open Letter to EXPERIENCED ENGINEERS

To Aeronautical, Electrical and Mechanical Engineers:

Today more than ever Engineers find themselves in the fortunate position of having the choice of many jobs with good pay, excellent future and on-the-job benefits. It becomes, then, a choice of surroundings, locality, living conditions, leisure time pleasures, and proper advantages for the family.

LOCKHEED'S Georgia Division, located at Marietta, only 8 miles from Atlanta, offers unequalled off-the-job benefits. Atlanta and North Georgia are famous for their healthful climate and outdoor sports. Atlanta is the second highest large city in the United States. Its 88 parks cover 1600 acres, and its 22 excellent golf courses offer year-round enjoyment.

The section is also famous for beautiful homes and gracious Southern living. Desirable, modern housing is available to the LOCKHEED Engineer and his family. Fine elementary and high schools, colleges and universities, plus vocational and professional schools, serve the area. 10 radio and 3 television stations and more than 50 theatres bring in top entertainment. Best cultural advantages are offered, and 500 churches are affiliated with 40 creeds and denominations.

Yes—YOUR EXPERIENCE can bring you a job with a new division of a top leader in commercial and military aviation, PLUS a BETTER life, a BETTER future, off the job and on.

(If you prefer the West Coast, your application will be promptly forwarded to LOCKHEED at Burbank, Calif., where similar opportunities are available.)

CLIP AND MAIL TODAY!

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Please send full details on MY opportunity at LOCKHEED

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City and State

Job Interested In

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AIRCRAFT CORPORATION

GEORGIA DIVISION
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Pave your way to smoother traffic flow

. . . resurface with Asphalt Mastic

Cracked and broken floors . . . they're hard on men, on equipment, on materials . . . and on the eyes.

That's why, today, more and more industrial concerns are resurfacing plant floors with cold-laid asphalt mastic made with Flintkote Flooring Emulsions.

It provides a tough surface for speeded traffic flow . . . efficient personnel and materials movement . . . economical operations.

And resurfacing floors this way is fast, easy and inexpensive. Mastic can be laid thick or thin over almost any clean firm sub-floor. It can be applied with hand trowel or power float and can be ready for use in as little as 48 hours.

A mastic floor made with Flintkote Flooring Emulsions is heavy duty. It holds up under concentrated traffic. It resists rutting. Cuts and scars are self-healing. If patching is necessary the job is done quickly . . . with the same materials.

Resurfacing with asphalt mastic makes floors non-slip, resilient, shock absorbing, water and fire resistant. They're quiet and comfortable to walk on . . . and work on.

Remember, it's easy on the overhead, too. Write today for complete information.

THE FLINTKOTE COMPANY, *Industrial Products Division,* 30 Rockefeller Plaza, New York 20, N. Y.

Atlanta • Boston • Chicago Heights • Detroit
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In London, England: Industrial Asphalts Company, Ltd.

FLINTKOTE
Products for Industry

Safety is no Accident!

It's engineered into SAFWAY maintenance towers

Only Master Welders work on SAFWAY Equipment

Interchangeable parts constructed by safe, strong, lifetime welding of high carbon tubing.

All SAFWAY Equipment Treated with Rust Inhibitor

Maintains accurate fit of parts and fasteners to assure safe, rigid maintenance towers.

Enamel is Baked on All Surfaces, Inside and Out

Improves appearance of equipment—helps insure lasting fit of parts and long life.

All SAFWAY Equipment is Engineered to Last

With only routine care, Safway equipment will deliver a lifetime of safe, efficient service.

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MILWAUKEE 13, WISCONSIN

Tubular Steel Scaffolding and Equipment

Maybe you've got every safety device you can use. Maybe you have a real good campaign to keep your workers safety-conscious. You still have to guard against human quirks and protect your workers from . . .

Guys Who Make Accidents Happen

By PAUL LOCKWOOD

SOME PEOPLE are accident-prone. They cause accidents or suffer accidents much oftener than the majority of us. Psychologists have found that these accident-attracting people usually show one or another definite personality trait.

Some can be helped and weaned from their destructive ways. Others are too big a problem for the industrial plant.

How well can you spot these people when they come to you looking for a job? Maybe these thumbnail sketches will help you.

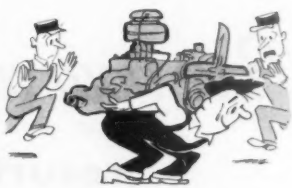
JOKER JACK

Joker Jack may avoid accidents himself, but his practical jokes can cause plenty of pain for others. A hot foot is mild entertainment compared to some of the weird stunts Jack pulls.

Through his horseplay the safety record of the department will be in danger. When Jack gets away with a trick the victims start thinking of something to do that will cause Jack some trouble—and another step is taken toward an accident that could have been avoided.

Some industrial relations directors keep accidents caused by horseplay at a minimum by establishing penalties. Layoffs and transfers may be the penalty imposed.

If these penalties fail, you might turn the tables on Jack and give him a hot-foot—right out of the plant.



STRONG MAN SAM

Strong Man Sam is proud of his strength. He can lift 100 pounds with his legs stiff—bending only from the waist. This lifting may not be dangerous, but like most strong men he is constantly trying to increase his strength.

He has heard that by lifting a calf every day a person will be able to lift the bull when the calf grows up. Sam translates this idea into terms of his immediate surroundings. He starts to lift a hub cap, then a wheel, and finally breaks his back with the automobile.

Sam can be spotted in the initial employment interview by his boasts of his strength. If he

Has many varied uses in manufacturing

Available in Natural or Synthetic sheets . . . die cut forms . . . custom molded forms and strips. With or without adhesive in four grades—Soft, Medium, Firm, Hard Densities . . . Thicknesses of 1/8 inch to 1 inch inclusive. Neoprene available in Soft and Medium density only.

A Few Places where it is Used

You'll find it used for motor mounting. For mounting speakers and many other parts in the radio and electronics field. It is used with laboratory equipment. Many use it for packing fragile materials during shipment. In die cut form it is used as a gasket. Sponge rubber is also used for cushioning or padding many products. Hard density is used as an ejector in die cutting operations. These are but a few of the many places where you'll find DUTCH BRAND Sponge Rubber being used in industry and manufacturing.

DUTCH BRAND Sponge Rubber Meets ASTM Specifications

ASTM Specification No. D1056-51T

No. 3082 Soft Density . . . RN11
No. 4022 Medium Density RN12
No. 4030 Firm Density . . . RN13
No. 4031 Hard Density . . RN14

Neoprene in soft and medium densities . . . details on request

Available in long lengths and wide widths.

All materials carefully checked for uniformity.

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Manufacturers of Rubber Products
DIVISION OF Johns-Manville
7800 WOODLAWN AVE. • CHICAGO 19, ILLINOIS

Other DUTCH BRAND Products

- **Masking Tape**
  - **No. 300 Crepe Back**
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  - **No. 302 Extra Strength**
- **Plastic Electrical Tape**
- **Friction Tape**
- **Rubber Insulating Tape**
- **Electro Coil Tape**
- **Glass Fibre**
- **Techni Tape**
  - **(cloth tape for industrial uses)**
- **Anti-Squeak Body Tape**
- **Cork and Rubber Stripping with adhesive**
- **Molded Rubber Products to specifications**
- **Die Cut Rubber Products**
- **Sheet Sponge Rubber**
- **Neoprene Sponge Rubber**
- **Rubber Coated Fabrics**
- **Sponge Rubber (with adhesives)**
- **Sponge Rubber Weatherstripping**
- **Gasket Sealing Materials**
- **Rubber Bonding Cements**
- **Special Cements to specifications**
- **Rubber Aprons**

FOR SAMPLE OF SPONGE RUBBER WRITE DEPT. FM

☐ Soft Density ☐ Firm Density
☐ Medium Density ☐ Hard Density

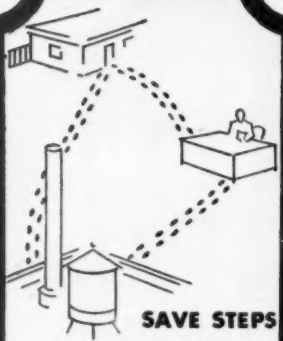
(Other DUTCH BRAND products listed above)

*Name*_____ *Title*_____

*Company*_____

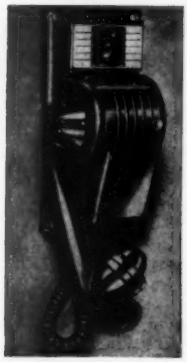
*Address*_____

*City*_____ *Zone*____ *State*____



SAVE STEPS
SAVE MONEY
PROMOTE SAFETY

OFFICE TO YARD
OFFICE TO OFFICE
INTERPLANT



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GUYS WHO MAKE ACCIDENTS HAPPEN

Begins on page 272

is already on the payroll he can be the cause of a high accident rate in the plant. One way to prove to Sam that safe lifting is best is to have one of the less powerful men in the plant show Sam how easy it is to lift something the safe way.

Of course, if Sam persists in doing things the hard way it may be best to find another man who doesn't have so much muscle—between his ears. If this happens, Sam will complain about how machines are putting men out of work, but his complaining will not be as dangerous as his exhibitions of strength.

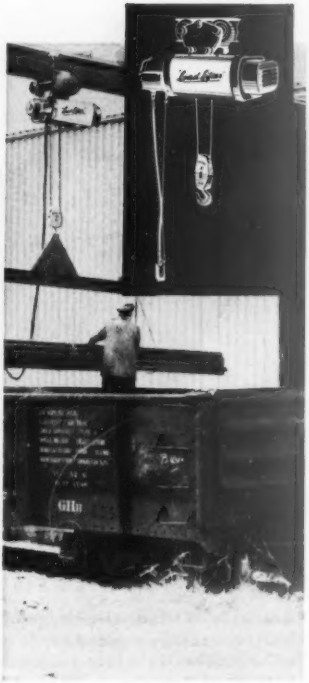
COCKY CALVIN

Cocky Calvin has been in the plant for a long time. He knows all the rules of safety. He hasn't had an accident in 20 years. He feels he is accident proof.

He looks at his engraved watch, given him for 20 years of safe work. Production is running behind schedule and Calvin's machine needs some minor adjustment. Instead of stopping the machine while the adjustment is made, Calvin reaches in to make the change—and comes back short-changed on fingers.

Calvin is one type of accident victim who presents a perplexing problem for industrial relations directors. He has been used as an example—new workers are assigned to him for training in safe operating procedures. Then, his 20-year safety record is broken.

Stressing safety with Calvin is an old story. He knows all the rules—has a watch to prove it. Using him as an example is fine



BREAKS DEADLOCKS IN PRODUCTION - -

Efficient load handling is the key to smooth-flowing production. The "Series 700" 'Load Lifter' Electric Hoist lifts a ton 30 feet a minute — shortens the handling cycle — gives men time to produce more.

The 'Load Lifter' operates at the push of a button. Man, load, and hoist are safeguarded by steel suspension, strong, heat-treated helical gears, powerful load and motor brakes, and only 24 volts at the push button.

Let the dependable fast-acting 'Load Lifter' wipe out delays and reduce costs for you. Capacities: ½ ton and up; single and two-speed control. Write for Bulletin 399.

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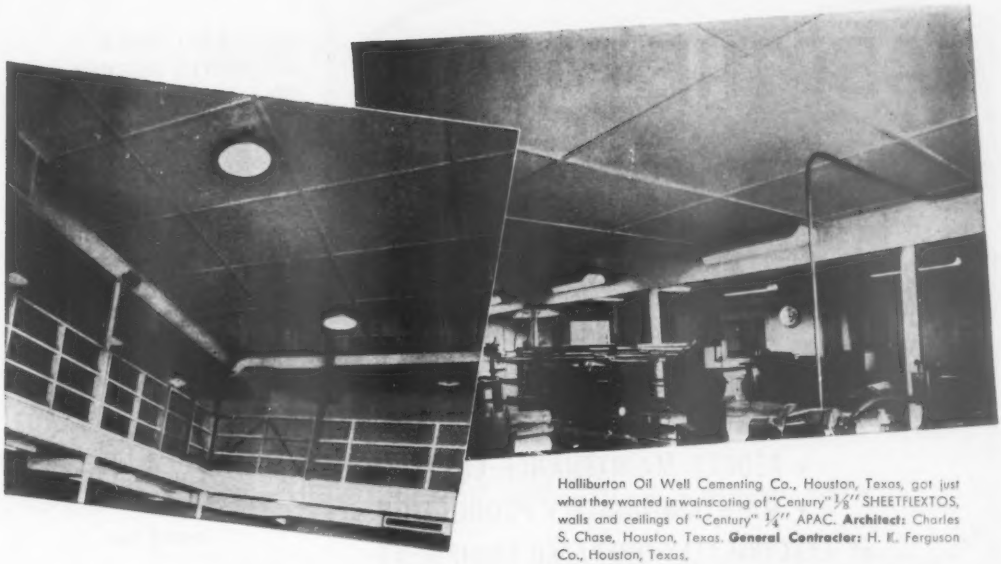
Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.



Halliburton Oil Well Cementing Co., Houston, Texas, got just what they wanted in wainscoting of "Century" $\frac{1}{8}$" SHEETFLEXTOS, walls and ceilings of "Century" $\frac{1}{4}$" APAC. **Architect:** Charles S. Chase, Houston, Texas. **General Contractor:** H. E. Ferguson Co., Houston, Texas.

Walls without worries

. . . ceiling without overhead

with **"CENTURY"**

ASBESTOS-CEMENT SHEETS

Halliburton Oil Well Cementing Co. wanted strong, good-looking walls and ceilings that would be *fire-resistant* and *easy to clean*. That's why they chose "Century" SHEETFLEXTOS for wainscoting applied over solid sheathing and "Century" APAC secured right to studs and joists for upper walls and ceilings.

Fire-resistance, of course, is an outstanding feature of these structural boards, combined as they are of virtually indestructible asbestos fiber and portland cement. Ease of cleaning, too, comes "naturally" to their hard, smoothly-textured surfaces that can't be hurt by water, dampness, or rot, and need no protective painting.

But look at the *extra* features that go with "Century" APAC and SHEETFLEXTOS. Both Sheets are also resistant to rodents, immune to termites. They go on fast, in big sheets (standard 4′ x 8′) that can be cut or drilled on the job, and fastened easily with screws or ring-fettered nails. They obviate the need for laths and plaster, and, while they require no painting at all, they take decorative colors well. SHEETFLEXTOS, as its name implies, has the added advantage of flexibility, to make curves and domes where indicated.

Both "Century" APAC and "Century" SHEETFLEXTOS make good surroundings for successful work and enjoyable living. Figure on one or both for your attractive, fire-resistant interiors. Write us for further details about these economical products . . . and name of your nearest distributor.

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GUYS WHO MAKE ACCIDENTS HAPPEN

Begins on page 272

when a new worker needs training. Perhaps a little less emphasis on the speed of production and more on safety would reduce the accident rate in the plant and help Calvin maintain his perfect record.

TOUGH TOM

Tough Tom is a close cousin to Sam. Tom probably has hair on his chest, but that is not the accident danger. Few men get the hair on their chests caught in a machine. Tom is tough in other ways—"hard as nails" is the way he describes himself.

Tom is so tough he has little regard for safety clothing. Goggles get in his way and make him a sissy. Safety shoes are a nuisance. Respirators are for weak sisters — not for tough hemen. So with his utter disregard for protective devices, Tom ranks high as an accident victim.

An even more serious aspect of Tom's toughness is the way he influences others in the plant. Because he does not like to use safety equipment he ridicules others who do. Following his example others disregard safety rules and the accident rate climbs.

When an accident does happen to Tom, he is the first to say that it wasn't his fault. He'll blame everything from the weather to his fellow employees. An injury may not stop him from being the tough guy in the department—in fact, it may increase his prestige for handling dangerous assignments.

Some industrial relations directors have discovered that Tom

How the Glidden Company ships fire in wooden crates

. . . keeps highly reactive liquids "bottled up" with Carey Asbesto-Sorb!

The solutions used for bleaching wood are highly reactive. If allowed to mix in uncontrolled amounts, spontaneous combustion usually results. Thus breakage of bottles in shipment could mean the break-out of fire in freight car or truck – a possibility that had to be eliminated!

The Glidden Company, a leading producer of wood bleaches, solved this problem with an industrial floor sweeping material, widely used to maintain safe, dry, oil-and-grease-free floor conditions. The material? Fire-proof Carey Asbesto-Sorb. In every pound there are literally millions of asbestos "sponges" to protect the bottles from bumps and shocks. And, *should* leakage or breakage occur for any reason, the thirsty fibers of Asbesto-Sorb "drink up" . . . keep the solutions from mixing.

Mr. T. A. Neuhaus, Technical Director of The Glidden Company, says: "We have no record of breakage due to packaging with Carey Asbesto-Sorb. We are completely satisfied with this successful packaging application."

Likely, Carey Asbesto-Sorb will serve you best in its major role – as an oil and grease absorbent. But among the hundreds of Carey products serving industry's operating, maintenance and construction needs, there are many more of particular interest to you. Your Carey Industrial Sales Engineer will gladly tell you about them—no obligation! Call him in soon!

CAREY BUILT-UP ROOFING at the White Motor Company's truck plant in Cleveland, Ohio. Maintained in prime condition by tough, long-lasting Careycled and Carey Fiber Coating—especially formulated to withstand the grinding abrasion of weather and corrosive fumes.

CAREYSTONE CORRUGATED ASBESTOS-CEMENT ROOFING and siding protects Gulf Oil Corporation's warehouses at Port Arthur, Texas. This material is absolutely impervious to corrosion, rust, rot, decay; never requires painting or preservative treatment; is virtually maintenance-free!

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QUESTION MARKS THAT

Waste Time and Money

Use the DIAMOND

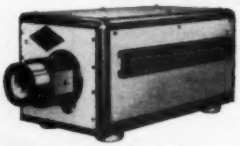
"UTILISCOPE"

(WIRED TELEVISION)

No production system is entirely automatic or perfectly integrated, because many operations and processes refuse to be self-disciplined . . . they must be watched. Often several operations need watching simultaneously to keep them in step. Such irregularities and uncertainties are a continual source of question marks that waste time and money.

The Diamond "Utiliscope" (wired television) enables you to eliminate these question marks. With it your supervisory staff can SEE what is going on at remote, inaccessible or dangerous points. A clear picture is transmitted of what is happening AS IT HAPPENS. Installations in many kinds of plants have proved that the "Utiliscope" can make important savings of time, money and manpower . . . in addition to improving safety. For further information, ask for Bulletin 1025G.

"UTILISCOPE" RECEIVER



"UTILISCOPE" CAMERA

WRITE FOR BULLETIN 1025 G

TYPICAL USES—Checking remote gauge readings • Watching flow of molten steel • Viewing nuclear research • Observing conditions inside furnaces Coordinating materials flow on conveyors. • "Utiliscope" (Reg. U.S. Pat. Office)

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FIRST IN INDUSTRIAL TELEVISION

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Diamond Specialty Limited — Windsor, Ontario

Since 1903, Diamond has Manufactured Quality Equipment For Industry

GUYS WHO MAKE ACCIDENTS HAPPEN

Begins on page 272

does have one vulnerable spot—his pocketbook. A few days off for failure to follow safe practices and to wear safety shoes, goggles, or respirators may turn the trick.

HOLLYWOOD HARRY

Hollywood Harry has been miscast as a lathe operator—he should have been on TV or in the movies. And, industrial relations directors working to reduce the accident rate wish he *was* on TV.

Showing off for visitors is Harry's special act. When a group of students, plant executives, or government officials visit the plant, he starts his show.

On a nailing machine, for instance, Harry will bring the shook together with a resounding slap. Then release the machine while his hands are still in dangerous territory to keep up the vaudeville tempo.

Plant music, instead of providing relaxation, sets Harry jitterbugging behind his machine. His antics at the lathe might be all right on TV, but his acting in the plant is dangerous.

Contacting a booking agent for theatrical acts might be the way to remove his accident cause from the payroll. But, in many cases Harry does not have stage sense —he is just a show-off.

Perhaps a more practical method of handling this worker is to transfer him to a location where he will not be seen by visitors. Actors love audiences and without an audience to see the show Harry may settle down and follow sage operating practices.

Fire can't hide from this "NOSE"

A slow burning fire in your storage spaces, electrical equipment, record vaults, etc., can cause plenty of damage. But not if this "Nose" is on the job!

Let the tiniest, slowest-burning fire just *try* to escape attention. The slightest whiff of smoke is collected by this "Accumulator" and sent to the central control panel of the Kidde Industrial Smoke Detector. Instantly, a warning is transmitted to your fire control headquarters or to the local fire department.

The Kidde Industrial Smoke Detector spots smoldering blazes fast, long before there is enough heat to set off automatic heat-actuated extinguishing or alarm devices.

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UNIT HEATERS
get Dependable Power

WHEN THE HEAT'S ON . . .

reliable Doerr Motors move it where needed. Typical Doerr heater applications are shown in the cabinet heater above and in the horizontal unit below—reliable performers from the Young Radiator Company line of top quality products.

Among the many features embodied in the Doerr Motor design for heater use is the resilient mounting specifically engineered to hold the motor securely in place during shipment and in all mounting positions. The formed clips prevent axial movement in either direction, while the hooked slots in the base prevent clips from springing outward.

If you have an unusual motor problem please let us hear from you.

you get More with DOERR!

DOERR
Electric Corporation
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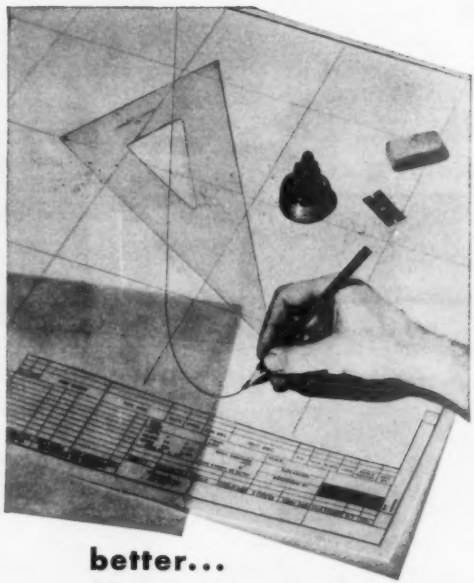
Electric Motors from 1/30 to 5 hp. Standard, or Designed to Your Specifications



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Here's the newest, most advanced idea in drawing materials—semi-transparent sheets of VINYLITE Brand Plastic . . . with accurate grid lines and title blocks printed *from the back!*

This means that drawings can be made with more precision, more easily, for these sheets of VINYLITE Plastics are dimensionally stable—won't shrink or stretch. It means clean, quick erasures—even ink can be scratched off with a razor blade. Your pencil is never in contact with the printing that *shows through* the tough sheet!

What's more, sheets of VINYLITE Plastic are easy to keep clean—they won't absorb grease, are resistant to water, perspiration, chemicals, most acids and alkalies. Finger marks and smudges wipe off with a damp cloth. And VINYLITE Rigid Sheets are easy to handle—stiff and crisp, yet pliable, they roll up or lie flat—resist wrinkling, cracking, fraying and aging. Since drawings can readily be removed from them, they can be re-used again and again this new time-and-money-saving way.

VINYLITE Rigid Sheets are finding scores of uses in defense and basic industry – templates, calculators, precision drafting instruments, maps and photographic transparencies, for instance. Learn more about them. Write Dept. NJ-86.

Data on "Dinoglass" sheets courtesy Di-Noc Company, Cleveland, Ohio

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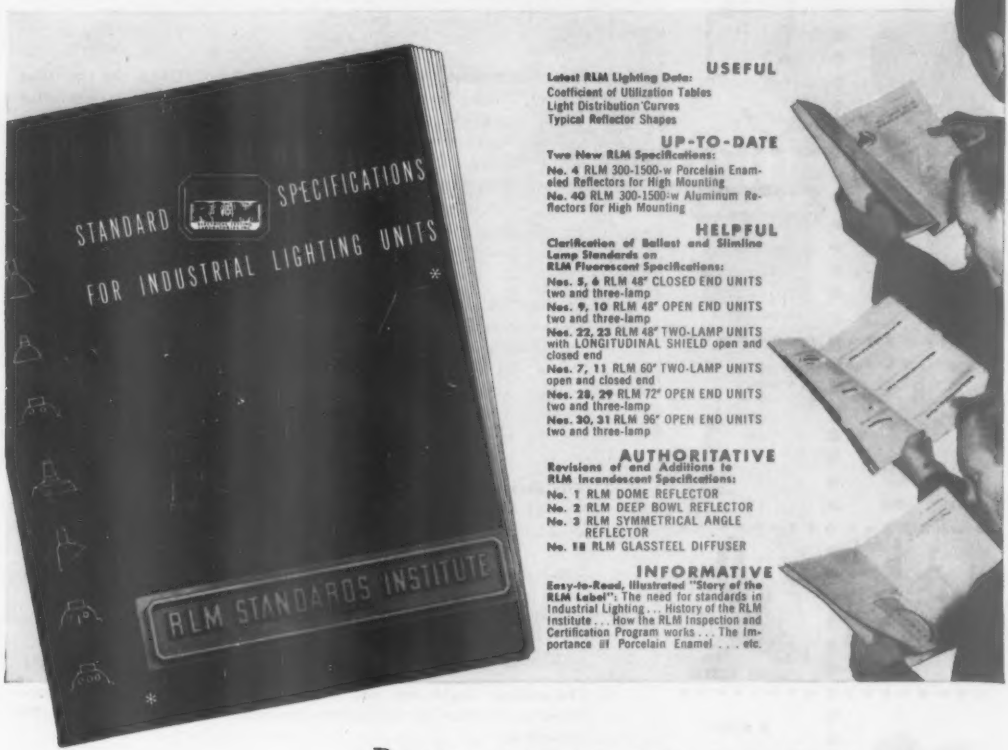
The RLM Standards Institute Announces its

1952 ENLARGED EDITION

of the RLM Specifications Book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Easy-to-Read, Illustrated "Story of the RLM Label": The need for standards in Industrial Lighting... History of the RLM Institute... How the RLM Inspection and Certification Program works... The importance of Porcelain Enamel... etc.

Published as a contribution to the advancement of the Science of Industrial Lighting, and as an aid to everyone who buys, sells, recommends or specifies Industrial Lighting Equipment.

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MERRILL
MATERIALS HANDLING
DEVICES

MERRILL BROTHERS
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MASPETH, N. Y.

Test Your Reading Ability

Answer the questions below *after* you have read "A Dozen Do's for Your Attack on Handling," on page 114. Then turn to page 286 for the correct answers.

1. **The main reason why the author wrote this article is the fact that:**
   ——a) There's not much opportunity left to make materials savings.
   ——b) There are plenty of opportunities for savings today, but they're not as obvious as they used to be.
   ——c) Most materials handling equipment in use today is obsolete.
   ——d) Most plants today are already heavily mechanized, so materials handling costs are no longer a problem.

2. **The author singles out for specific mention one method that he feels is especially good for analyzing fast or infrequent materials handling operations. That method is:**
   ——a) Process charts.
   ——b) Time study.
   ——c) Inventory records.
   ——d) Motion pictures.

3. **The author's experience with ideas from other industries is that:**
   ——a) They're often readily adaptable.
   ——b) They're not worth much because adapting them is too costly.
   ——c) They're pretty good for some industries, but not for electronics.
   ——d) They're not as useful as they might be because the basic principles vary so much.

4. **The author singles out one kind of important expert who's sometimes overlooked in the search for materials handling ideas. The expert is:**
   ——a) The methods engineer.
   ——b) The materials handling engineer.
   ——c) The personnel man.
   ——d) The man on the job.

5. **The author cites an example of an electric-eye counting system that didn't work. What finally solved the problem was:**
   ——a) Infra-red ray counter.
   ——b) Improved electric-eye system.
   ——c) Use of a microswitch.
   ——d) Weighing counter attached to conveyor.

6. **What simple way to avoid duplication of work and loss of good ideas is recommended in this article?**
   ——a) Keep a project record.
   ——b) Complete every job immediately.
   ——c) Don't change engineers in middle of job.
   ——d) Consult with all concerned at start of each project.

Turn the page

More than 500 lbs. of pulchritude swing securely on a strip of "Tape-Strap" reinforcing tape.

Super-strong reinforcement for containers, too

TAPE-STRAP*

OK

"Tape Strap" is approved by the Official, Southern, and Western Classification Committees (Rule 41, Sec. 8 (b), Supp. 29, C.F.C. No. 19) and by Railway Express Agency, Inc., (Supp. No. 36 to Official Express Classification No. 34)

Packaging costs drop . . . as much as 85% . . . when you switch to super-strong, easy-to-use "Tape-Strap" for carton reinforcement. This gummed filament tape has a tensile strength of 180 pounds per inch of width.

"Tape-Strap" is so strong that short, 10-inch strips are all you need for most applications. The tape is so quick and easy to apply that shipping room operations speed up. Users report spectacular time savings . . . as much as 75%.

You need no costly equipment to apply "Tape-Strap." It's quick, easy, and safe to use. No sharp edges to cut, and it's applied without pressure.

Write for free sample roll and complete data.

DROP TEST . . .

TAPE-STRAP holds after 126 falls. Four 10-inch strips of "Tape-Strap", one across each side seam, reinforce this Belsinger Box, loaded with 100 pounds of screws. After 126 falls in the drop tester, the carton is failing, but "Tape-Strap" still holds the seams.

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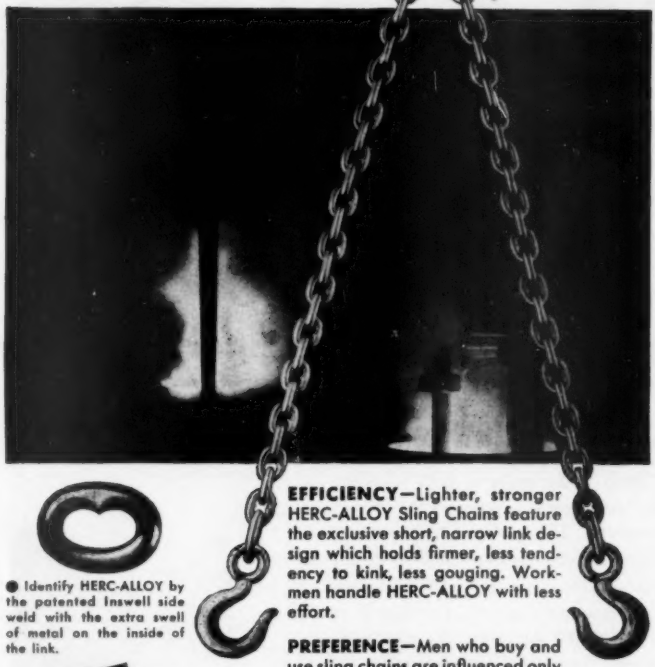
SLING CHAINS

STRENGTH—Size for size, no other sling chain offers a greater tensile strength. HERC-ALLOY will not crystallize—never requires annealing.

SAFETY—HERC-ALLOY Sling Chains are made to your specifications. Every new sling carries a written guarantee, is registered and tested before shipping. This registration serial number is carried at the top link.

● Serial number permanently affixed near top link for positive identification.



● Identify HERC-ALLOY by the patented Inswell side weld with the extra swell of metal on the inside of the link.

EFFICIENCY—Lighter, stronger HERC-ALLOY Sling Chains feature the exclusive short, narrow link design which holds firmer, less tendency to kink, less gouging. Workmen handle HERC-ALLOY with less effort.

PREFERENCE—Men who buy and use sling chains are influenced only by facts learned through experience. HERC-ALLOY Sling Chain preference has been built up over the years, not just by what we say, but by how HERC-ALLOY performs on the job.

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TEST YOUR READING ABILITY

Begins on page 282

7. **The author cites an example of a proposal that saved $100,000 net a year, at an installation cost of $200,000. What happened in that case:**
   - ——a) Company cleaned up after second year.
   - ——b) Company lost $80,000.
   - ——c) Company found theoretical figures overstated savings.
   - ——d) Company didn't buy idea because it wasn't well presented.

8. **One way to protect yourself against surprises is to:**
   - ——a) Be careful not to admit you don't know something when questioned.
   - ——b) Have more than one engineer work on each project.
   - ——c) Make a second survey to be sure you've missed nothing important.
   - ——d) Keep higher management constantly informed of progress.

9. **One of the following is not a good way to make a report sell your ideas. Which is it?**
   - ——a) Make it clear and "fast."
   - ——b) Put the results up front.
   - ——c) Go easy on drawings and photos.
   - ——d) Offer proof the proposal will work.

10. **The author recommends that you try to adapt standard equipment to the job. What does he say about special equipment?**
    - ——a) It's nearly always cheaper.
    - ——b) It's easier to maintain.
    - ——c) It's fine if you're short on skilled engineering talent.
    - ——d) It's fine if you find it will do the job better.

Turn the page

originators and pioneer developers of

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Want to lower your fastening costs? Reduce your bit inventory? Save on tool costs and conserve steel? Then switch—now—to Apex bit holders and insert bits.

Any one Apex bit holder will accommodate a full range of Apex insert bits to drive Phillips, Frearson (Reed & Prince), Slotted, Clutch Head or Socket Head screws. Bits "float" slightly in the holder, assuring easier alignment with screw recess, increasing bit life. Because the bits can be quickly and easily interchanged, you need only a minimum bit inventory to meet all your screwdriving requirements.

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U. S. Patent No. 2,522,217
Canadian Patent No. 440632

and insert bits

to drive these screws:

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TEST YOUR READING ABILITY

Begins on page 282

SCORING INSTRUCTIONS

Be sure to figure all three of your scores: comprehension, speed and reading index. For a full explanation of these scores, as well as information on how to improve your scores, see "How to Read Better and Faster," on page 84 of FACTORY's October 1951 issue. If you've passed your copy along to someone else, write the Editor for a reprint.

Comprehension score: Just add up the percentage credits for each of the questions you answered correctly.

Speed score: Refer to your note of how long it took you to read the article. Convert the time into seconds. Divide the result by 10. This answer you divide into 2125 (number of words in the article). Finally, multiply this last result by 6. This will give you your reading speed in words per minute. (If you recorded your time in decimal minutes, you can get the result directly by dividing the time into 2125.

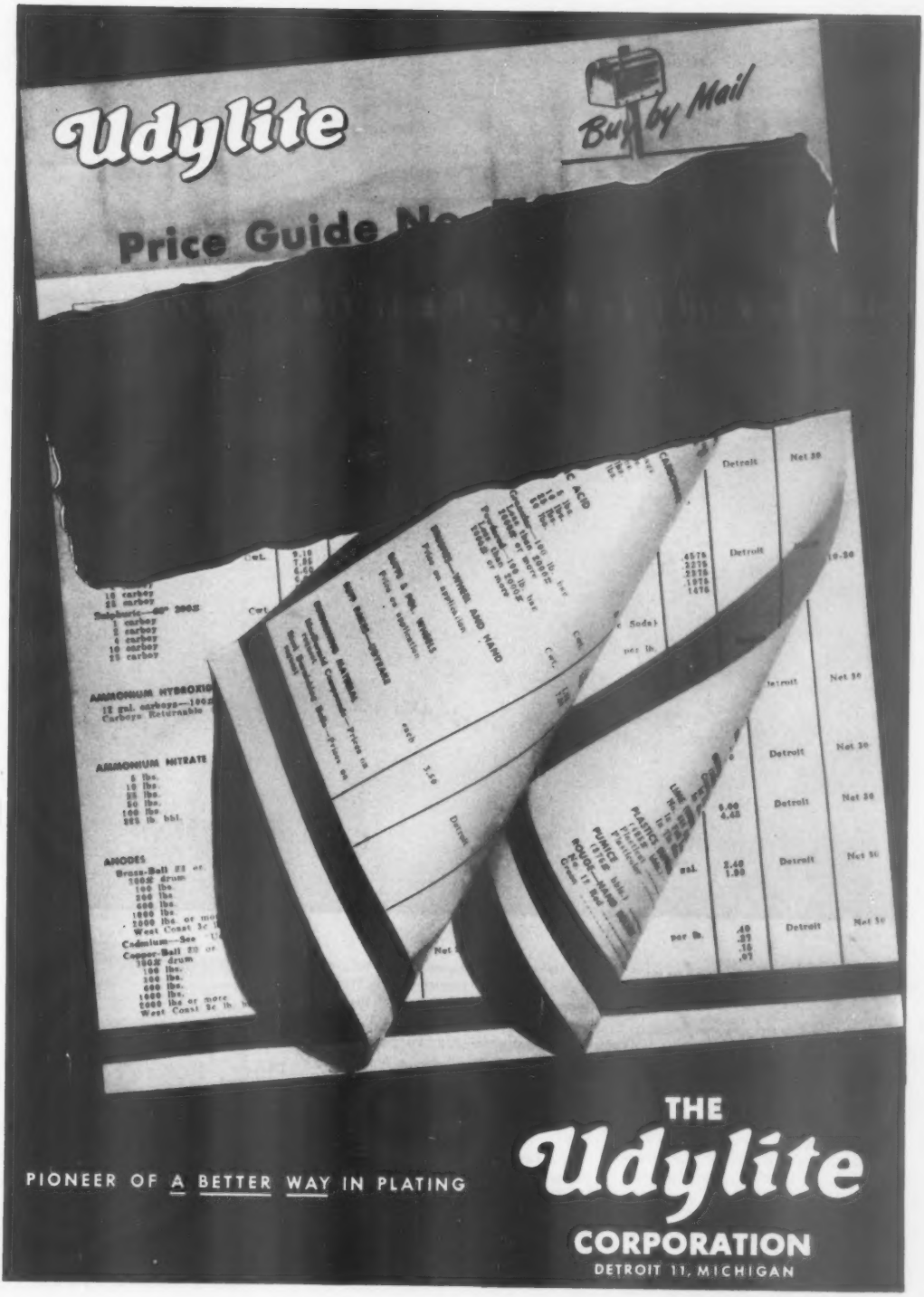
Reading index: To find your reading index, multiply your speed in words per minute by your percentage of comprehension and divide by 100. Do not figure reading index if your comprehension score is less than 75%. With lower comprehension, the reading index is not valid.

Now check yourself against this table of reading indexes: 400 or more (excellent); 300-399 (very good); 250-299 (good); 200-249 (fair); 150-199 (poor); below 150 (very poor).

Let us know how you came out on your reading score. A post card will do — sign it or not.

ANSWERS TO TEST QUESTIONS

Q	A	Credit	Q	A	Credit
1	b	20	6	a	10
2	d	10	7	b	5
3	a	10	8	c	10
4	d	10	9	c	10
5	c	5	10	d	10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Standardized FA Switchboards are noted for their safety, efficiency, dependability and economy of operation.

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All are built from standardized, pre-assembled units. This flexible system of assembling complete sections and units into standardized enclosures not only provides all the advantages of "tailor-made" switchboards but affords substantial savings in cost.

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The No. X458 Drop-Forged Rivetless Chain for Trolley Conveyors (illustrated above) has the improved webbed side link which substantially stiffens it. Also, this type link prevents telescoping of the chain while in service. Simple and strong, it is cheaper and lighter per unit of ultimate strength than any other type of conveyor chain. It can be installed or removed by unskilled labor. Having no rivets, welds or bolts, X458 Chain requires no special or joining links and may be disconnected at any point, yet it is so designed that it cannot become disconnected while in service. No. X458 Chain is completely interchangeable with the Webb FIRST—the original No. 458 Chain designed in the early Twenties by Mr. Jervis B. Webb.

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NEW MATERIALS

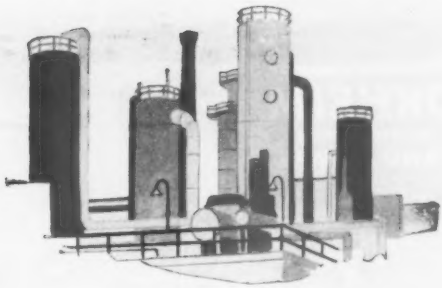
NEOPRENE LIQUID COATINGS are getting better all the time. Atlas Mineral Products Co., Mertztown, Pa., has entered the field with Neelium—a high-solids liquid neoprene solution that can be brushed and cured at room temperatures into a thick protective film. Atlas claims Neelium has greater abrasion resistance than rubber or the low-viscosity neoprenes.

And the Mercer Rubber Corp., 64 Reade St., New York 7, has added three new neoprene liquid coatings to its line. One's for protection against high-temperature steam and acid splashes; another is for skid-proofing; and the third is for protection of immersed equipment — valves, pumps, and pipes.

FOR FILTERING AND SIFTING highly corrosive chemicals, the United States Gasket Co, Camden, N. J., offers a line of perforated Teflon sheets and tapes. These Teflon filters are tough, resilient, and impervious to all acids, alkalis, and solvents except molten sodium and fluorine. Open area ranges from 18% to 37%.

PHOS-SILVER—a copper, phosphorus-silver alloy permits efficient brazing of copper, brass, and bronze, claims the Westinghouse Electric Corp., Box 2099, Pittsburgh 30. Phos-Silver's low brazing temperature (1225-1275 F.) reduces brazing time and provides an extra margin of safety when there is danger of overheating the work. High fluidity permits Phos-Silver to penetrate tight joints.

LOW-PRESSURE LAMINATES molded of glass cloth at 3 to 30 psi. pressures have remarkable heat stability, according to Dow Corning Corp., Midland, Mich. They'll stand continuous heat at 500 F., intermittent heat at 900 F. The



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PITT CHEM 101
A versatile, heavy duty coating that withstands severest corrosive conditions.

PITT CHEM 102
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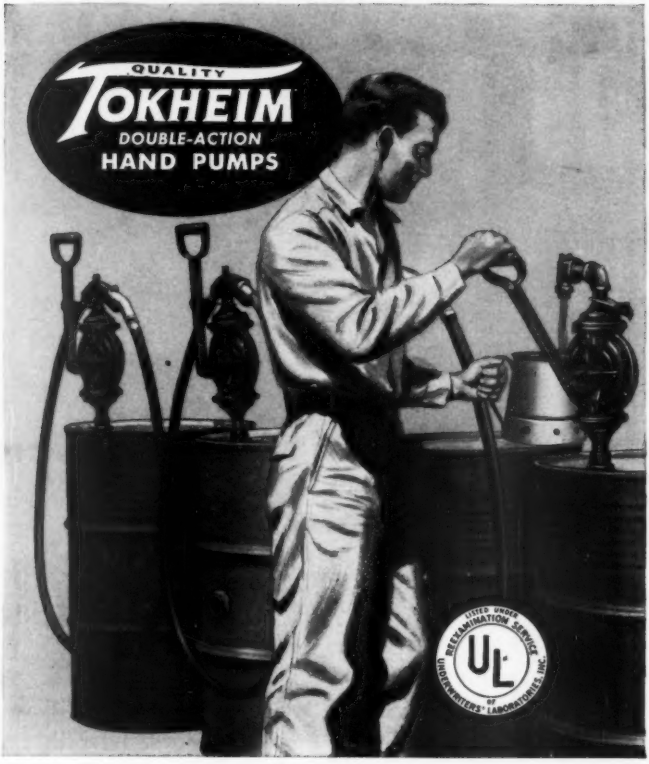

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General Products Division

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NEW MATERIALS

Begins on page 290

new laminates have the physical and electrical properties of high-pressure silicone-glass laminates. They machine easily, weigh less than aluminum and magnesium, and are stronger than either at 500 F.

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100 WATERPROOF TAPE for all practical purposes. That's what Bauer & Black, 222 W. Adams St., Chicago 6, claims of its new Polyken No. 329. The new tape meets tough government specification (Jan-P-127) for Type I Grade A tapes. It's said to have excellent tack, high tensile strength, and provides an almost perfect barrier against moisture and vapor.

TUFCLAD is chemical porcelain armored with fiberglass - reinforced plastic. Plastic shell is resilient to cushion the porcelain from impact, tough to hold line pressures even when the porcelain base is cracked or broken. It also insulates against thermal shocks. Available for valves, pipes, fittings, also in special shapes, from Lapp Insulator Co., Inc., Process Equipment Div., Le Roy, N. Y.

MOLYKOTE - CENTERLUBE gives bearing surfaces the low friction, anti-seizing properties necessary to resist extreme pressures and temperatures. It's for dead-center lubrication wherever loads and speeds are beyond the capacity of conventional lubricants, says The Alpha Corp., 179 Hamilton Ave., Greenwich, Conn.

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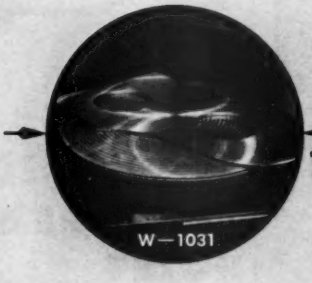

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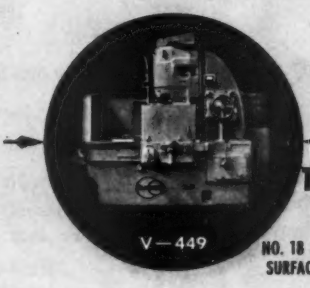

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24"

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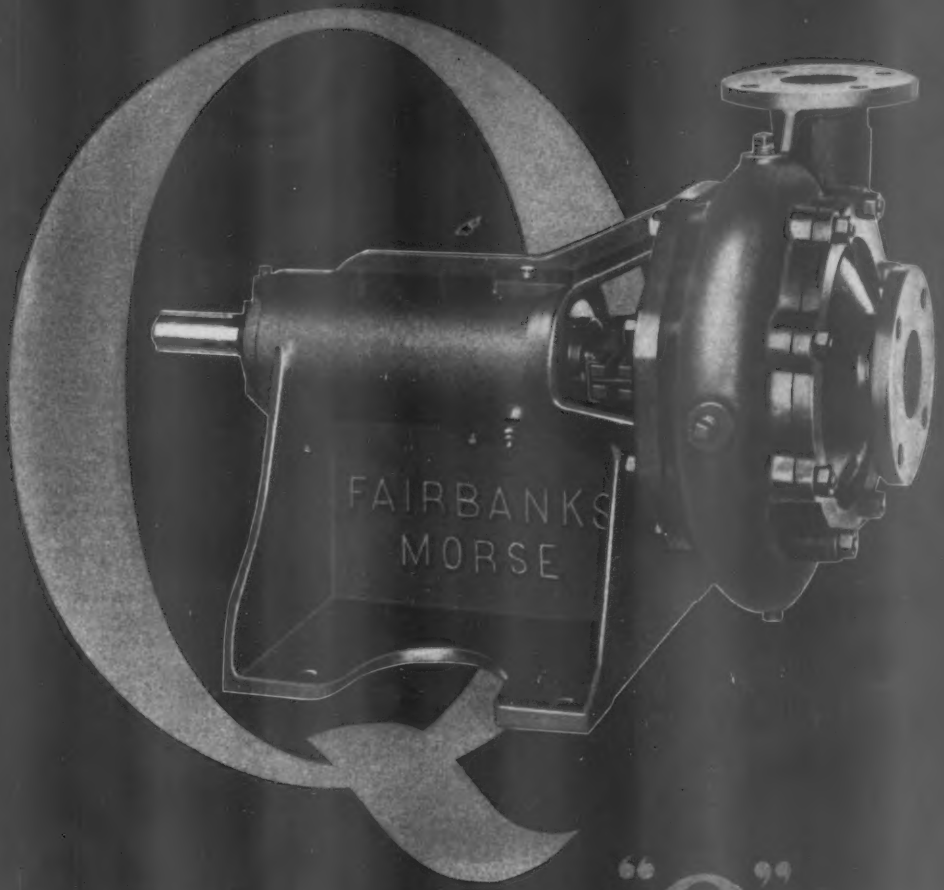

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BOOKS

For Time Study and Production Executives

WORK MEASUREMENT: NEW PRINCIPLES AND PROCEDURES

By ADAM ABRUZZI. Columbia University Press, Morningside Heights, New York 27. Charts tables, references, bibliography, index. 290 pp. $6.

Dr. Abruzzi makes no bones about it. He thinks that time study is an inadequate method of work measurement — and that all standard data procedures now used are invalid.

Time study fails, according to Dr. Abruzzi, because it depends upon subjective measurements. "Subjective measurement methods do not necessarily yield valid results just because objective measurement methods are not available. Actually, it is impossible to obtain precise and accurate results unless objective measurement methods do exist."

He adds that the shortcomings in time study practice are not overcome by piecemeal measures. "A comprehensive inquiry into the subject is required instead, leading to a completely reformulated system of objectives and estimating procedures."

Dr. Abruzzi's new approach to work measurement is based on statistical techniques.

The mathematics of the development of his methodology are heavy—but his conclusions are clearly defined. He has organized his statistical tools to show:

- When a process can be considered standardized;
- How to make precise estimates and predictions of production rates; and
- How to develop production standards known to be attainable.

The trend is toward broader

1. Clark Fork Truck
2. Ross Carrier
3. Service Motowlift
4. Lewis-Shepard Fork Truck
5. Gerlinger Carrier
6. Baker Fork Truck
7. Mobilift Model HT
8. Automatic Fork Truck
9. Buda Fork Truck

A GOOD QUESTION TO ASK

Are the chains

DIAMOND ROLLER CHAINS?

Since the earliest types of material handling machinery were developed, Diamond Roller Chains have had an important part in their operation. Developed to eliminate back-breaking lifting and toting — the performance of these machines naturally must provide trouble-free safe service.

For this Diamond Roller Chains have proved impressively their long-life dependability, the unvarying uniform quality, great reserve strength and high efficiency.

That is why the answer to the question "Are the drives Diamond Roller Chains?" is so preponderantly "Yes".

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BOOKS

Begins on page 296

application of statistical techniques to plant operating problems. And Dr. Abruzzi is a well-known authority in the field. So the book adds up to important reading for all industrial engineers and others concerned with work measurement and wage incentive application.

For Top Planners

PLANNING AND DEVELOPING THE COMPANY ORGANIZATION STRUCTURE

By **ERNEST DALE.** American Management Assn., 330 W. 42nd St., New York 36. Charts, tables, bibliography, appendices, index. 232 pp. Members, $3; nonmembers, $4.50.

By 1975 the headquarters of large corporations may become management consulting companies assisting groups of manufacturers and distributors (the branch operations) to make their own final decisions.

This is but one of the conclusions reached by Author Dale after study of 40 top companies, a spot-check of 150 others. The survey hits at present-day organization practice and future trends. His findings point to:

- A definite movement toward group decision-making.
- A corresponding increase in central controls to check whether the delegation of authority is working well.
- More and more conflicts between staff and line, with some staff people trying to assume line authority.
- Increasing span of control.
- A move away from the "earthquake approach" to organization change, with reorganization occurring more gradually.

Turn the page

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Every Wayne Air Compressor is sold on the basis of known efficiency in terms of *useable air output*. Designed, engineered and built in Wayne plants, each compressor is an exclusive Wayne product. Because it is "job-engineered", you are assured of buying guaranteed air output for a specific job.

Wayne Compressors are checked for volumetric efficiency, performance and operating tolerances. Inspection standards are high, and units must measure up to rigid requirements in every case. Every working part has been designed for minimum maintenance and low operating cost. This quality control gives you a better compressor. The performance guarantee lets you select it according to actual useable air output required.

You get every dollar's worth of air output when you buy Wayne. Also important, every compressor is backed by a nationwide service organization. Make your next compressor Wayne!

ENGINEERED 10 WAYS BETTER!

1. Larger aircooling flywheel
2. Extra cooling fins on cylinder blocks
3. Easily cleaned intercooler
4. Dual intake valves
5. Positive lubrication system
6. Dual moisture extractors
7. Counter-balanced flywheel . . . smoother operation
8. Automotive type pistons . . . less heating
9. Accessible drain-cock assures easy moisture removal from tank
10. Easy to clean filter and muffler

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND

HAVE YOU TRIED THIS FINEST OF PLASTIC TAPES?

PLYMOUTH PLASTIC
Electrical TAPE

PACKED INDIVIDUALLY
One 66-ft. roll, ¾" width in single pocket-size metal can

CONVENIENT FIVE-PACK
Five 30-ft. rolls, ¾" width in handy container

RECOMMENDED IN PLACE OF FRICTION AND RUBBER TAPES IN THE FOLLOWING SITUATIONS:

1. Where tape is subject to abrasion (resists abrasion).
2. Where space is limited (makes neater job, as in terminal box).
3. Where tape is subject to water, acids, alkalies, corrosion (resists all).
4. Where time must be saved (does the job much more quickly).

PLYMOUTH RUBBER COMPANY, INC.
Manufacturers of SLIPKNOT — The World's Largest Selling Friction Tape
CANTON, MASS.

SPECIFY
Evans
"WHITE-TAPE"
IN 6 FT. · 8 FT. OR 10 FT. LENGTHS

Quality features packed into every inch of this outstanding white tape:

the best WHITE TAPE made at the lowest price yet

Snow-white blade with bold, legible, jet-black numerals and graduations. Graduated in 32nds for first 6 inches.

Sturdy die-cast case heavily chrome-plated, calibrated for quick reading inside and outside measurements.

Blade ½" wide made of finest high carbon steel—tempered—Bonderized—enamelled—baked.

Blade replaceable in seconds—without tools—without even opening case. And Evans replacement blades cost far less.

Exclusive Evans automatic brake gives smoother push-pull action with absolutely no "creeping" of tape into case.

Underside is white too. Mark with ordinary pencil, remove mark with flick of thumb.

Every "Evans White-Tape" is unconditionally guaranteed.

Check these list prices:
10-ft. $1.49 8-ft. $1.19 6-ft. 98¢

Evans & CO. · ELIZABETH, N. J. MONTREAL, QUE.
Prices Higher in far west and Canada. Order from your tool distributor.
Makers of Evans Folding Rule and "The Folding Yardstick"

For copies of books and booklets reviewed, write directly to publisher listed

BOOKS

Begins on page 296

Book Briefs

THE DESIGN OF SWITCHING CIRCUITS

A primer on the use of electromagnetic relays in automatic controls. But be prepared for some rough going through heavy mathematics. By Keister, Ritchie, and Washburn. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3. 556 pp. $8.

NORTH AMERICAN COMBUSTION HANDBOOK

A basic reference on the art and science of industrial heating with gaseous and liquid fuels. Plenty of helpful charts, tables, and illustrations, plus a glossary of terms. The North American Mfg. Co., 4455 E. 71st St., Cleveland. 322 pp. $2.

PSYCHOLOGY IN INDUSTRY

An analysis of the major factors that affect worker efficiency — based on recent research and practice. By J. Stanley Gray. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 401 pp. $4.

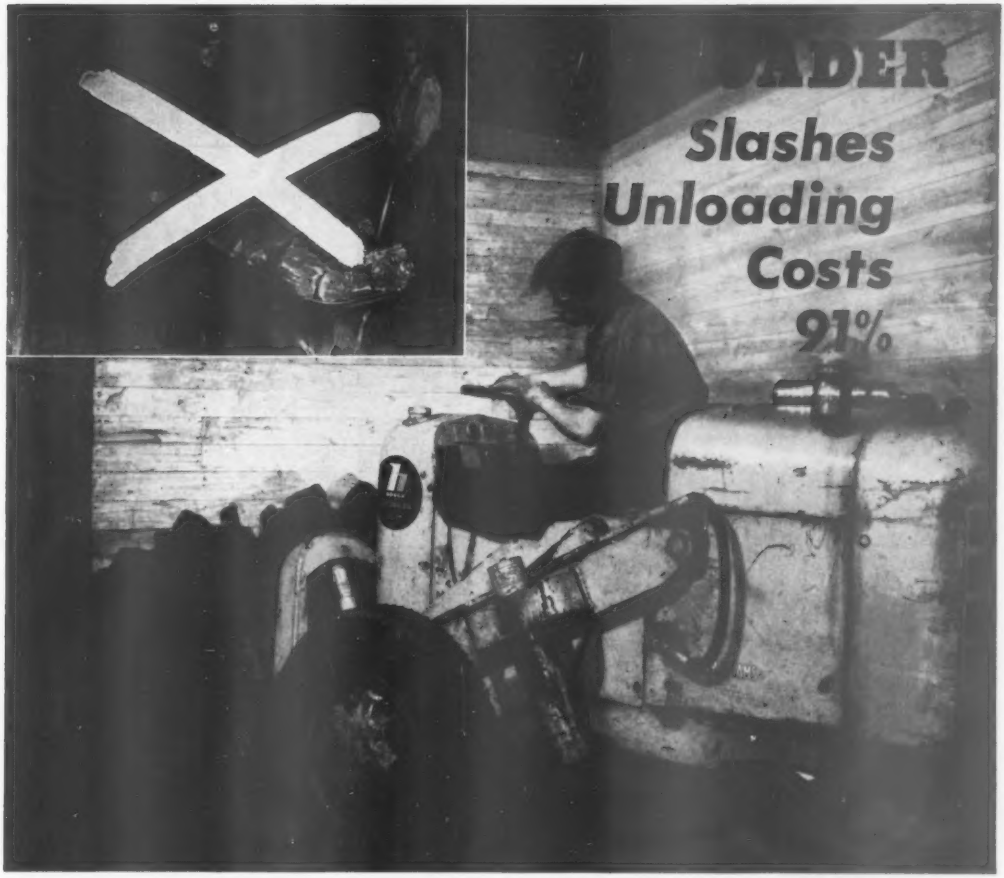
MODERN ARC WELDING

Principles and practice of carbon, inert-gas-shielded, submerged, and other forms of arc welding. Contains a complete self-study course for training operators. Hobart Trade School, Hobart Sq., Troy, Ohio. 544 pp. $3.

SUCCESSFUL EMPLOYEE BENEFIT PLANS

Detailed coverage of the various employee benefit plans—how to design them and then put them across. 561 pp. $8.85. Prepared by the Editorial Staff of Prentice-Hall, Inc., 70 Fifth Ave., New York 11.

Turn the page



* A complete report on Timken's use of "PAYLOADERS" for bulk material handling is found in Vol. 1, No. 3 of INDUSTRIAL HANDLING. Copy of this is available for the writing. Literature on any of the "PAYLOADER" models is also available, without obligation: the 12 cu. ft. Model HA, the 15 cu. ft. Model HAH, the ½ yd. HE, the ¾ yd. HF, the 1¼ yd. HY or the big 4-wheel drive Model HM.

At Timken Roller Bearing Company,* three men, with hand shovels and wheelbarrows, used to work hard for 20 hours to unload a 50 ton car of heavy lump ferromanganese. Now, one man on the "PAYLOADER" tractor-shovel does the job easily in 5 hours — so that unloading time is reduced 75% and manhours are reduced 91%. This is only one example in hundreds where the "PAYLOADER" has effected amazing savings in time, labor, and costs . . . in loading, unloading, transporting, piling, spreading, and dumping all kinds of bulk materials.

This distinctive tractor-shovel is completely Hough-built *expressly for tractor-shovel work*, with superior features that insure more production and satisfaction — such advantages as several speeds in BOTH directions, and large pneumatic tires that work on ground or floors. If *you* have bulk material handling problems "PAYLOADERS" can probably help you solve them. The Frank G. Hough Co., 755 Sunnyside Ave., Libertyville, Illinois.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. • Since 1920

LOOK INTO THIS!
WAR on WASTE
by
Engineered Maintenance
A COMPLETE FILE OF WORKING DATA FOR APPLYING
1. CHAMPION'S PLANNED CLEANING PROGRAM
2. CHAMPION'S GROUP REPLACEMENT PLAN [FOR FLUORESCENT LAMPS]
3. CHAMPION'S GROUP REPLACEMENT PLAN [FOR INCANDESCENT LAMPS]
CHAMPION
means THE BEST

— *if you have any interest in lighting efficiency and economy*

— *and if you'd like the answers to questions such as these:*

WHAT is the most profitable cleaning cycle for the lamps in my plant?

HOW can I duck 83% of my lamp burnouts?

WHEN does group replacement pay off?

WHY and *how* can I replace six lamps for what it now costs me to replace one?

YOURS WITHOUT COST OR OBLIGATION

JUST MAIL THIS COUPON

CHAMPION LAMP WORKS
LYNN, MASSACHUSETTS

Please mail *Free File Folder C* on planned cleaning and group replacement.

Name..... *Position*.....
Company.....
Street.....
City..... *Zone*..... *State*.....

For copies of books and booklets reviewed, write directly to publisher listed

BOOKLETS

Begins on page 296

HOW TO PLAN A MORE EFFICIENT OFFICE. Wood Office Furniture Institute, 730 Eleventh St., N. W., Washington 1, D. C. The basic do's and don't's to keep in mind in laying out your offce. 16 pp. Free.

LIGHTING FOR INDUSTRY. Holophane Co., Inc., 342 Madison Ave., New York 17. A helpful guide that hits the problems of industrial lighting right on the head. Photos, charts, tables, index. 96 pp. Free.

RADIOISOTOPE APPLICATIONS OF INDUSTRIAL SIGNIFICANCE. Office of Technical Services, Department of Commerce, Washington 25, D. C. A list of companies that are using radioisotopes and how. Index. 89 pp. 30¢.

AIR POLLUTION ABATEMENT MANUAL—CHAPTER 12. Manufacturing Chemists' Assn., Inc., Woodward Bldg., 15th and H Sts., Washington 5, D. C. A really extensive bibliography of air pollution literature published up to Jan. 1, 1952. Contains more than 1500 references. 57 pp. 50¢.

UNLOADING FLAMMABLE LIQUIDS FROM TANK CARS. Manufacturing Chemists' Assn., Inc., 246 Woodward Bldg., 15th & H Sts., Washington 5, D. C. Recommended safe practice for equipment and personnel. 11 pp. 20¢.

SOUTHERN INDUSTRIAL DIRECTORY. Southern Assn. of Science Industry, 5009 Peachtree Rd., Atlanta, Ga. First really comprehensive survey of Southern industry. Lists the 3000 largest manufacturing plants, also major trade associations, and research institutions. 60 pp. $5.

WHY DO THINGS *The Hard Way...*

Unretouched photos show ease and speed of changing bags: quick-release clamp is removed in seconds—

—filter bag then slips off lower collar. Top end of bag is removed and replaced with similar ease.

...WHEN DRACCO FILTER MAINTENANCE IS SO EASY?

The special mechanical design of Dracco Dust Control Equipment reduces filter maintenance in two important ways:

1. **Dracco Filters last longer**

   —skilled engineering and accurate manufacturing prolong the life of filter bags and moving parts.

2. **Replacing Dracco Filter bags is simpler**

   it's *easy*—no awkward, unwieldy frames or screens to move in and out of filter housing.

   it's *clean*—all work is done on clean air side.

   it's *fast*—quick-release clamping devices save valuable time.

Dracco Dust Control Equipment has many other superior features which will provide an economical solution for your dust problem. Why not call in Dracco today?

DRACCO CORPORATION

Harvard Avenue and East 116th St. • Cleveland 5, Ohio

Write today for the Dracco Engineering Data Sheet which will facilitate an analysis of your dust problem. Address Dept. F-7, Cleveland 5, O.

DRACCO *Performance Proved*

DUST CONTROL EQUIPMENT • PNEUMATIC CONVEYORS

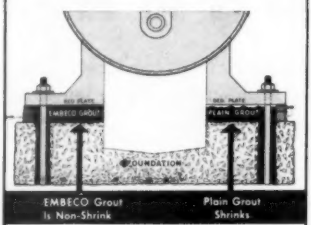
Equipment Need

Regrouting?

Use **EMBECO**

Non-Shrink Method

Embeco (1) produces flowable, *non-shrink*, ductile grout which . . . (2) gives full, level, *lasting* bedplate contact . . . (3) helps avoid costly shut-downs. (See illustration below.) Write for Embeco booklet . . . gives grouting method based on 35 years' experience.



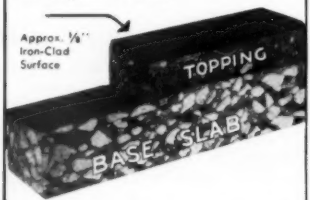
EMBECO Grout Is Non-Shrink — Plain Grout Shrinks

• • •

Concrete FLOORS Worn Out?

Resurface With "Iron-Clad" MASTERPLATE

Masterplate floated into fresh concrete produces iron-armored floor with 4-6 times greater wear-resistance than best plain concrete floor; also spark resistant, static-disseminating and non-slip. Non-colored and 11 colors. For new floors and resurfacing. Write for Masterplate booklet.



For full information on Embeco and Masterplate, write —

The MASTER BUILDERS Co.

Subsidiary of American Marietta Company

Cleveland 3, Ohio • Toronto, Ontario

INDUSTRIAL FILMS NOW AVAILABLE

"WHAT MAKES US TICK" is a 12-min., 16 mm. color cartoon that describes the stock market in non-technical terms. Available for free showing from:

Modern Talking Picture Service, Inc., 45 Rockefeller Plaza, New York 20.

"ALL'S WELL THAT ENDS WELL" demonstrates the use and installation of solderless terminals. 16 mm. sound color. Its companion: **"BY THE MILLIONS"** shows how solderless terminals in continuous strips can be applied at speeds of up to 4000 per hour. Shows mass production made possible by specially designed machines. 16 mm. color. Both films available from:

Aircraft-Marine Products, Inc., 2100 Paxton St., Harrisburg, Pa.

"MOTORS IN INDUSTRY" tells the story of the progressive mechanization of industry from hand operation to continuous process. A methods engineer explains mechanization in terms that can apply to any industry. 27 minutes, sound-color. For free loan, write:

Distribution Section, Advertising & Sales Promotion Div., General Electric Co., Schenectady 5, N. Y.

"STOP THE FIRE THIEF" deals with the causes of industrial fires and shows how you can eliminate them. Describes handling of flammable liquids, discusses such hazards as defects in electrical equipment, welding torch sparks, heating equipment, and poor housekeeping. 13 minutes, black & white sound. For sale: $104; for rent: $10 a week. (Half price for National Safety Council members). Write:

National Safety Council, Film Services Bureau, 425 N. Michigan Ave., Chicago.

Turn the page

*Mechanized Maintenance**

—saved this roof!

Saved labor, time and dollars for its owner

*** A MECHANIZED GRAVEL REMOVER,**

operated by one man, loosened the gravel and exposed the clean roof mat of the Old Goff Mills building in Pawtucket, R. I. . . . as fast as six men could do the job by hand spudding. Dry spots and cracks were readily accessible—easily repaired.

*** A MECHANIZED ROOFING PUMP**

delivered Tremco Roofing Preservatives from the ground, 65 feet up the side of the building, right to the dry felts. Resaturation was speedily accomplished . . . with no spillage . . . with one man doing the work of four.

THE TREMCO MAN recommended these Mechanized Maintenance methods after careful examination of this roof. Result: a revitalized roof that will give years of low maintenance service. And the job was done with substantial savings in time and labor! Write for 32-page booklet, "Solving Roof Problems". The Tremco Manufacturing Company, Cleveland, Ohio, or The Tremco Manufacturing Company (Canada) Ltd., Toronto.

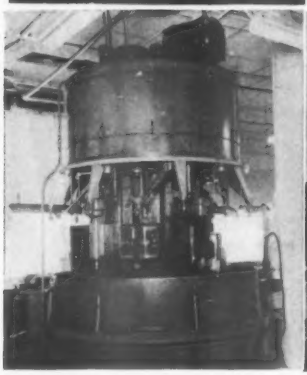
TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

Large or Small...

Century MOTORS

Are Designed to Provide All the Performance That Is Built Into the Machines They Drive



Century 25 horsepower motor on a large automatic production machine.

75 Horsepower Century drip proof motor on a copper tube drawing machine.

Century 125 Horsepower motors on circulating pumps for chilled water. Used in department store.

Here are some typical examples of equipment powered by large Century motors, which were application engineered for TOP PERFORMANCE.

Matching the operating characteristics of your equipment is made easy through Century's wide line of single phase, polyphase and direct current motors to choose from. They are made in many types, ranging in size from 1/8 to 400 horsepower, with literally hundreds of specifications adaptable to specific applications.

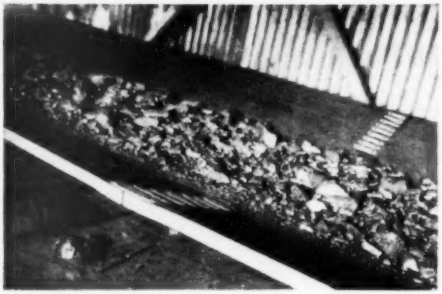
Get Top Performance of your equipment through skillful motor application by specifying Century motors on the equipment you buy and for replacement.

Century MOTORS

CENTURY ELECTRIC CO.
1806 Pine St., St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

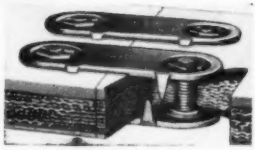
FLEXCO®

BELT FASTENERS and RIP PLATES



FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

- ★ FLEXCO Fasteners make tight butt joints of great strength and durability.
- ★ Trough naturally, operate smoothly through take-up pulleys.
- ★ Distribute pull or tension uniformly.
- ★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
- ★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

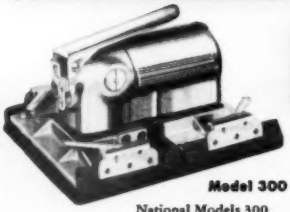


Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO., 4678 Lexington St., Chicago 44, Ill.

Sanding Problems?

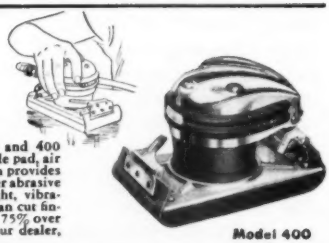


Model 300

National Models 300 and 300A are straight line action, reciprocating, two-pad, air sanders. Felt, rubber, and neoprene pads in different sizes and shapes are available for various types of surfaces and materials. Water attachment is built in for wet sanding.

NATIONAL SANDERS

can speed production in your finishing room



Model 400

National Models 100 and 400 are orbital action, single pad, air sanders. Orbital action provides faster cutting and longer abrasive life. These lightweight, vibrationless, fast sanders can cut finishing time as much as 75% over hand sanding. See your dealer, or write for details.

NATIONAL NS SANDERS

NATIONAL AIR SANDER, INC.

2816 AUBURN STREET, ROCKFORD, ILLINOIS

FILM PROGRAM OF THE MONTH

COST CUTTING TARGETS . . .

. . . for the work sampling tool (see page 83). Here's a list of films that may help you decide where you want to concentrate your program.

"PROCESS CONTROL" is a new Navy film on the use of statistical methods as a tool in producing better products more cheaply. Runs 12 minutes, costs $12.86. Its companion feature: **"ACCEPTANCE SAMPLING"** covers the statistical methods employed in acceptance sampling. Runs 18 minutes. Costs $24.26. Both the above films are available from:

Castle Films, 1445 Park Ave., New York 29.

"THE FLOW PROCESS CHART AND HOW TO USE IT" is a 15 - min. sound-color film that shows in animated sequences the principles and applications of the Otis chart. Tells how to prepare one. Write:

Univ. of Michigan, Audio-Visual Education Center, 4028 Administration Bldg., Ann Arbor, Mich.

"METHODS ANALYSIS" gives you the story of a job analyst preparing a job specification, also discusses job rating and time study. The 10-min. sound film is designed to show how to cut production costs. For sale: $55. Available from:

Text-Film Dept., McGraw-Hill Book Co., 330 W. 42nd St., New York 36.

"A PICTORIAL STUDY OF METHODS IMPROVEMENT PRINCIPLES" shows how principles are applied to such operations as grinding, assembly, heat treating, and packaging. 45 min., color-silent. Write:

Supr. of Work Standards, Saginaw Steering Gear Div., Div. of General Motors Corp., Saginaw, Mich.

See also page 304

ONE-MAN HANDLING

for loads up to 15 tons

Here's the low-cost way to lift, transport, lower and stack heavy materials *anywhere* within an entire bay! One man with a push-button does the entire job with a P&H Trav-Lift without rehandling!

The Trav-Lift is custom built to your requirements. With variable speed full magnetic control, you may have five distinct steps for all motions to meet every need for speed or precision handling.

A number of standard designs enable us to meet your needs at far lower cost when service requirements do not warrant investment in a heavy-duty crane. The Trav-Lift is a product of P&H — America's leading builder of overhead handling equipment.

Handle it "thru-the-air" at lower cost.

P&H OVERHEAD CRANE DIVISION

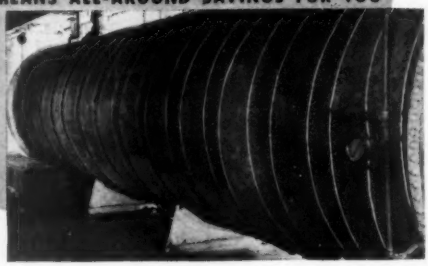
HARNISCHFEGER CORPORATION

4525 West National Avenue • Milwaukee 46, Wisconsin

Power Shovels • Crawler and Truck Cranes • Overhead Cranes
Hoists • Arc Welders and Electrodes • Soil Stabilizers
Diesel Engines • Pre-Fabricated Homes

THERM-ENOMICS* by Baldwin-Hill

how Keeping Heat in a Vulcanizer MEANS ALL-AROUND SAVINGS FOR YOU



1. Wrap B-H metal-reinforced Black Rockwool Blankets around the vulcanizer's external surface—butt blanket edges carefully to secure a blending interlock. B-H Blankets are excellent insulation for any curved or irregular surface and give protection up to 1200°F.

Saves overlapping waste

2. Bind blankets with galvanized steel bands, but *FORGET* about wrapping the blanketed area with wire or metal fabric. The metal-reinforcing layer built into every B-H Blanket forms a perfect binding and base for finishing cement.

Saves one complete operation

3. Apply one thickness of Powerhouse Cement—let it dry and paint the finished coat. B-H Powerhouse Cement forms a perfect bond with the B-H Blanket and dries quickly to a smooth, paintable surface.

One coat application saves time

Baldwin-Hill insulations are designed for more than effective, efficient heat saving... they're also designed to save you time and money... Thermenomically. Send for complete information today.

*Economics of engineered heat control.

Baldwin-Hill

PLEASE SEND ME COMPLETE INFORMATION ON:

- ☐ BLANKETS (Metal-bonded, versatile, Black Rockwool Overall Insulation)
- ☐ POWERHOUSE CEMENT (High-adhesion, Black Rockwool Insulating-Finishing Cement)
- ☐ MONO-BLOCK (Porous, felted, Black Rockwool Insulation Block)
- ☐ NO. 1 CEMENT (Plastic, rust-inhibiting, Black Rockwool Insulating Cement)

BALDWIN-HILL COMPANY, 952 BREUNIG AVENUE, TRENTON 2, N. J.

DETECTO SCALES

There's a precision-accurate Detecto Scale for your specific weighing and counting need. The Detecto helps increase production, yet assures you maximum accuracy by making slightest weight, discrepancies immediately visible.

DETECTO-GRAM RATIO COUNTING SCALE

Another Detecto-Gram Scale to speed counting operations. Model #1743 has a special counting tray attached to the beam for use when counting in odd amounts.

Write for Catalogue

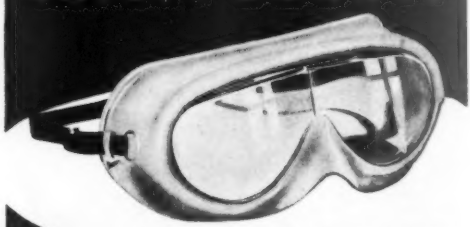
DETECTO SCALES • INC.

MAKERS OF FINE SCALES SINCE 1900

545F PARK AVE. • BROOKLYN 5, N.Y.

SCALE ENGINEERS IN ALL PRINCIPAL CITIES

the New SAF-I-DUO SAFETY GOGGLE



With Replaceable Lens

- Velvety Comfort—VINYL frame fits contour of all faces snugly.
- Lens of Optically Correct OPTILITE or *Acid-resistant* plastic.
- Maximum protection from Impacts, Chemicals and Dust. (Four types of ventilation.)
- Economical—one-piece replacement lens at low cost. (Lens interchangeable with SAF-I-SPEC.)
- Can be worn over prescription glasses.

Write for literature and prices.

UNITED STATES SAFETY SERVICE CO.

BRANCHES IN PRINCIPAL INDUSTRIAL CITIES

PARMELEE LTD. Toronto

Hammering Problem?

Black & Decker Electric Hammers Save you Money, Muscle and Man-Hours!

4 MODELS, rated by drilling capacity in concrete for holes up to ½", ¾", 1⅛", and 2".

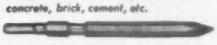
Drilling, Demolition, Scaling, Seaming...

In *any* construction, maintenance or repair job involving a *hammer* action, Black & Decker Electric Hammers save you hours of laborious, costly hand labor! These husky tools deliver thousands of sharp, positive hammer blows per minute. They are light, compact, completely self-contained; require no transformer or extra equipment; operate from any electric outlet, A.C. or D.C., or from a portable generator.

See your nearby Black & Decker Distributor for a demonstration. Ask him about quality-built B&D Hammer Tools, too. Write for free catalog of more than 100 Electric Tools to: THE BLACK & DECKER MFG. CO., 623 Pennsylvania Ave., Towson 4, Maryland.

A Hammer Tool for Every Job

STAR DRILL: *For clean, round holes in concrete, brick, cement, etc.*

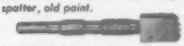


BULL POINT: *For demolition work on concrete, stone, brick, etc.*

COLD CHISEL: *For chiseling, scaling, surfacing concrete or metal.*

WOOD CHISEL: *For cutting and gouging in wood.*

SCALING CHISEL: *Removes rust, weld spatter, old paint.*



BUSHING TOOL: *For removing form marks or scuffing concrete surfaces.*

SEAM TOOL: *Cleans out old mortar between bricks or masonry for repointing.*

BD

SAVE TIME — 11 seconds was average time for sealing these cartons the "Snake Tape Way". Yet, these "TWO Strips" make a stronger closure.

SAVE DAMAGE - So strong is strap-like Snake Tape, that it is used to reinforce packages that "get it in the end".

SAVE HANDLING COSTS — Here, Snake Tape substitutes for steel . . . makes ONE package out of four! Try Snake Tape for unitizing your packages. Send for test sample.

Angier

Distributors in Principal Cities

Angier Corp., Framingham 1, Mass.

FREE ( ) 20 yd. sample Snake Tape and literature.

(NAME, TITLE)

Clip this to your letterhead.

BEHIND THE BYLINE

Meet some of the men in industry who wrote articles for this issue of FACTORY.

C. E. STEPHENSON is a 20-year man at R. J. Reynolds Tobacco Co. He's spent the past year coordinating and managing various electrical and mechanical shops. He writes about maintenance scheduling, page 99.

FRED MATHEIS has designed, tested, manufactured, and engineered rubber belt conveyor installations since 1913. Now he writes about selecting and maintaining them (page 108). Position: assistant vice president, Thermoid Co.

H. C. CHRISTENSEN worked at industrial engineering for several companies before joining Sylvania Electric Products Inc. He throws his experience your way, describes how Sylvania cut handling costs (page 114).

Turn the page

BARRETT

PALLET LIFT-TRUCKS

Barrett Handling Equipment

For Money-Saving Short Hauls
. . . Load Spotting
General Pallet Handling

Model EX—new and improved Barrett Hydraulic Pallet Truck

Model EX Hydraulic Pallet Lift-truck. Capacity 2500, (4000 and 6000 lb. capacities available). 25", 27" or 30" frame width. Fork length, 36" to 60". Height, lowered 3¼". Lift, 4".

Here's the last word in safe, economical handling of single or double-faced pallets. It's made for fast, easy operation . . . *built for years of service.* The improved Model EX is ideally suited as auxiliary equipment, often eliminating the expense of power truck operations.

Barrett Pallet Trucks *need less operating space* with their short turning radius—get into tight corners with no lost-time gaps; materials movement is continuous. Standard 4" lift prevents snagging. Complete hydraulic lifting and lowering—with any desired number of strokes to raise the load. It gives you operation for light loads—less effort for heavy ones. Just step on release treadle to lower.

Check ALL the features and you will know why Barrett Hydraulic Pallet Trucks are industry's choice.

Write for literature.

For skid handling . . . the Model ED, powerful Barrett Hydrolift Junior with full hydraulic multi-stroke lifting and lowering. Widespread front wheels for stability, even with high loads. 2500, 4000 and 6000 lb. capacity. 4" lift. 17⅜" and 24¾" widths.

Barrett Steeleg Skid eliminates needless extra handling. Material stays on skid from loading to destination. Platform type, box type, stake type, Write for Bulletin 4882.

HAND LIFT-TRUCK—MODEL J—Single stroke type lift-truck; popular all-round model—2500 lb. capacity. Model R—4000 lb. capacity. Ask for Bulletin 5110.

Barrett Handling Equipment

BARRETT-CRAVENS COMPANY
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ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT

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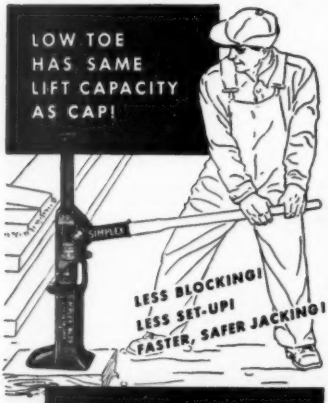


SIMPLEX
RATCHET LOWERING
JACKS

Lift or Lower the Load Notch by Notch—cannot be Tripped.

With Simplex Ratchet Lowering Jacks minimum toe clearance is necessary. Loads are usually lifted from the ground to the toe of the jack by pinch bars or wedges. Only Simplex Jacks provide equal lift capacity on toe or cap. No other jacks offer such a combination of low cost and all-purpose utility. In fast jacking action—extra-safety features—and rugged strength for longer life, Simplex Ratchet Lowering Jacks give you more for your money! Available in capacities of 1½ to 35 tons. Write today for Bulletin: Industrial 49.

SAFETY SUGGESTION—Use thin wood block—Don't lift or lower steel against steel.

Simplex
LEVER • SCREW • HYDRAULIC
Jacks

TEMPLETON, KENLY & CO.
1018 South Central Avenue • Chicago 44, Illinois

BEHIND THE BYLINE

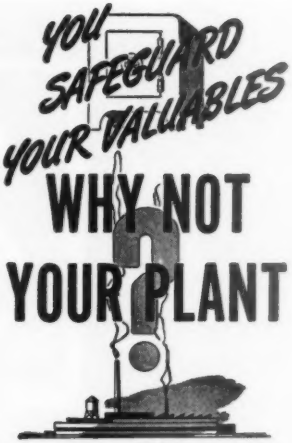
Begins on page 310

CHESTER L. BRISLEY has had 17 years of industrial engineering experience. He's now industrial engineering manager for the Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Inc. The company has been a forerunner in use of work-sampling techniques (page 84).

WILLIAM A. KISSOCK, vice president of industrial relations, Hotpoint, Inc., has directed the company's workforce expansion program for the past three years. His answer to the manpower problem: planned employee advancement. See page 90.

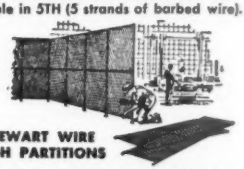
R. F. WOLL is just the man to tell you if your motor's really too hot (page 130). He began his career testing motors for Westinghouse in 1937, now designs them in his present post as design engineer. Has done some teaching, too.

Turn the page



Unfenced property invites vandalism and sabotage. Don't take chances in these dangerous days. Fence NOW and be safe. Surround your property with a Stewart Non-Climbable Chain Link Wire Fence. Also available for protective measures are Stewart Wire Window Guards, Steel Folding Gates, Wire Mesh Partitions and other products. Catalog No. 85, which contains complete information, will be sent on request.

Stewart 3TH Chain Link Wire Fence. Also available in 5TH (5 strands of barbed wire).



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Sectional with standard panels. May be arranged to fit any space. Ideal for locker rooms, toolrooms, storage rooms.

Other Stewart Products: Iron Picket Fence and Gates; Iron and Wire Window Guards; Sliding and Folding Steel Gates; Iron Railings; Steel Settees; Skylight and Machinery Guards; Bronze Plaques, and many others. When writing for information, please mention products in which you are especially interested.

Stewart maintains sales and erection service in all principal cities.

THE STEWART IRON WORKS CO., INC.
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Users of Acadia Synthetic Rubber component parts in hundreds of industries have found them unsurpassed. No matter what function synthetic rubber must perform, depend on Acadia parts. They best meet exacting specifications and operating conditions such as moisture, oil, heat, wear and age resistance. Molded, extruded, die-cut to close limits—compounded to meet specific conditions. Acadia engineers will gladly cooperate.

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PULL down costs with a.....

Pump operates at any angle . . . in any position!

If there's a job of pushing, pulling, bending or spreading to be done, a Hein-Werner "Push and Pull" Hydraulic Jack will prove to be a great time-and-labor saver.

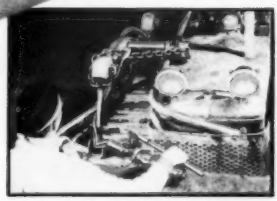
The new Hein-Werner "JacKit" (C-21) includes the service-proven 20-ton "Push and Pull" Hydraulic Jack and basic attachments complete in sturdy wooden chest.

Available in models of 4, 10 and 20 tons capacity complete in wooden chest or rollaway metal stand. See your industrial supply distributor or write us.

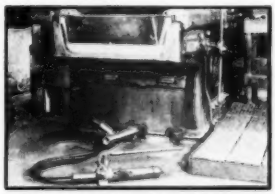
The Hein-Werner line of hydraulic jacks is COMPLETE! It includes Under-Axle Jacks of 3, 5, 8, 12, 20, 30, 50 and 100-tons capacity . . . "Bumper-Lift" Hydraulic Jacks for passenger cars . . . "Swift-Lift" and Service Jacks for shop use.

Hein-Werner HYDRAULIC JACKS

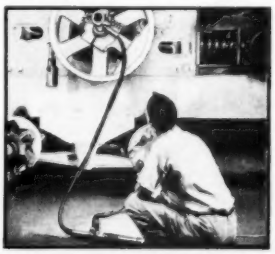
HEIN-WERNER CORPORATION
WAUKESHA • WISCONSIN



Pulling and pushing to straighten bent lifting arm of Bulldozer without removing from tractor.



Shimming and leveling of heavy grinder easily accomplished with Spreader.



Pulling heavy main drive wheel off shaft.

BEHIND THE BYLINE

Begins on page 310

MILTON M. SHERWOOD started with Thompson Products, Inc., in 1940 as a machine operator. He worked his way through top personnel jobs until he became factory employment manager last year. Tells how to salvage errant employees (page 106).

JOHN H. BEMIS was a sports writer before joining Anaconda Wire & Cable Co. 15 years ago. He's served in various capacities since then. For the past five years he has devoted himself to employee and community relations. He manages that department, recommends movie nights (page 122).

R. L. GALLOWAY, assistant production control manager for Trane Co., has been with the company for three years. He tells you about space-saving on page 102. He moved into his present spot after doing time study and other varied production engineering jobs.

You Can Select Faster, More Efficient PRODUCTION

from the broader range of Brown & Sharpe Cutters

The closer you match your cutters to each job, the faster, more efficiently they will cut . . . and the less power it will take.

Brown & Sharpe offers a complete range of cutters that permits accurate selection of exactly the right cutter for each cutting job! Styles include every type from plain milling cutters and end mills to metal slitting saws and cutters for special uses. And every cutter is a *quality* product . . . designed and produced to fulfill the enduring accuracy that is built into today's milling machines.

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Look at that production line—neat as a pin! It's the Philco Corporation plant at Sandusky, Ohio. They turn out television receivers and automobile radios, and they can't afford a slow-down caused by improper placement of parts and materials in production and storage areas.

So they keep their aisles clear and uncluttered by marking their lanes and areas with "Scotch" Pressure-Sensitive Tape No. 471. And they've found *tape* costs less.

...thanks to lanes marked with tape that lasts 5 times longer!

There's no "drying-time" with tape, no delaying production—just clean the floor, put it down, adhere firmly with roller or wide-wheel truck. Plastic backing lasts 5 times longer than conventional materials. No special applicating equipment needed. Easy to patch and match, too.

"Scotch" Pressure-Sensitive Tape No. 471 comes in 8 colors for lane marking, and in many widths. For complete information write: Minnesota Mining & Mfg. Co., Dept. FM72, St. Paul 6, Minn.

SCOTCH BRAND Pressure-Sensitive Tape No. 471

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 270 Park Avenue, New York 17, N.Y. In Canada: London, Ont., Can.

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The S. S. UNITED STATES

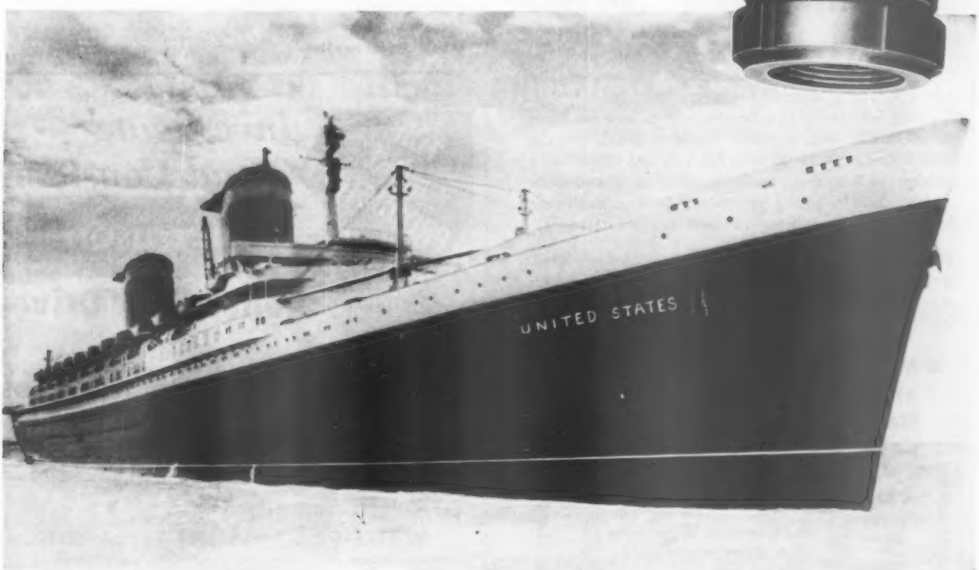
. . . a $70,000,000 investment protected by REPUBLIC FIRE HOSE

This luxuriously appointed goliath is the largest steamship ever built in our country. It is also one of the world's largest structures of any kind—afloat or ashore!

Designed by the famous naval architects, Gibbs & Cox, Inc., and built by the country's foremost shipbuilders, Newport News Shipbuilding and Dry Dock Company, the S.S. United States will soon be ready to challenge all comers for speed, comfort and safety of travel across the North Atlantic.

Republic Rubber is proud to have served the builders of this great ship. The thousands of feet of Republic Fire Hose selected for duty aboard this vessel will provide the highest degree of safety for passengers, crew and cargo.

We hope the hose never sees action. But should necessity arise you can bet it'll turn in an outstanding performance—typical of all Republic Industrial Rubber Products!



• The supership United States is built to carry 2,000 passengers, a 1,000-man crew and to convert, if necessary, into a transport for 14,000 troops. Secret features of design enable the 4½-block long leviathan to steam 10,000 miles without refueling. The Republic Fire Hose used on this installation is built with long-lasting rubber tube surrounded by a double jacket of flawless cotton fabric.

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REPUBLIC RUBBER DIVISION

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YOUNGSTOWN, OHIO

RED STRIPE* BRUSHES

look better... work better... are better!

UNWRAP a Red Stripe brush . . . look at it . . . heft it . . . flex the bristles . . . you can actually see and feel the quality construction, the superior working features of this brush! Red Stripe combines hogs' bristle with scientific Neoceta bristle . . . the bristle designed specifically for painting. Neoceta, a product of Pittsburgh research, wears at the same rate as hogs' bristle, giving you a long-lasting brush that looks better . . . is better . . . and *works* better!

FOR THE ADDRESS of the Pittsburgh supplier nearest you, write: PITTSBURGH PLATE GLASS COMPANY, *Brush Division*, Dept. M-1, 3221 Frederick Ave., Baltimore 29, Maryland.

*** Made by the manufacturers of PITTSBURGH'S famous Gold Stripe BRUSHES**

FREE—the story of Neoceta—its development, its amazing characteristics. Write to the address shown elsewhere on this page for your free copy of this interesting booklet.

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You should use Chicago "Safety Plus" Screws in Standard Listed Sizes.

They fasten products more securely, give a tighter hold for a neater appearance, and our three quarters of a century of experience in making fine threaded products guarantees a consistently more uniform accuracy to create sharper, smoother threads for a quicker, easier fit. They save money, too, because fewer screws and a faster fit means LOWER COSTS all down the line. Call the INDUSTRIAL SUPPLY DISTRIBUTOR nearest you today. Ask him for Chicago and get "Safety Plus".

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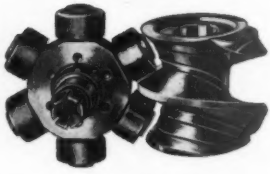

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Reduce maintenance costs
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41%

OF INDUSTRIAL WORKERS
ARE VISUALLY UNQUALIFIED FOR THEIR JOBS

The record of visual performance tests of more than 5,000,000 individuals, in 4,000 job categories, reveals that, regularly, four of every ten industrial workers are visually unqualified for satisfactory performance on their jobs. It also shows just the degree to which these are the workers who are responsible for high costs . . . in accident rates . . . in waste and rejects . . . in labor turnover . . . in training time . . . in absenteeism.

YOU CAN IDENTIFY THE "VISUALLY UNQUALIFIED" IN YOUR PLANT

The Bausch & Lomb Occupational Vision Service is a scientific method for determining visual standards for every job, for identifying those who qualify, and for correlating visual skills to job requirements . . . to the profit of the employee and the employer.

A PROVED METHOD TO HELP YOUR PLANT MAKE MONEY 9 WAYS

The Bausch & Lomb Occupational Vision Service is available to you. It is easy to administer. Employee participation is voluntary . . . *and workers like the program.* Benefits which accrue in plants using O.V.S. (benefits which can accrue in your plant, too) include:

1. Improved quality of production
2. Increased production per worker
3. Reduced waste of materials and work rejects
4. Improved accident record
5. Reduced labor turnover
6. Lowered training cost
7. More effective placement
8. Reduced absenteeism
9. Improved employee relations

MAIL TODAY!

Send for the brochure "Eyes Right for the Job," which tells what the Bausch & Lomb Occupational Vision Service is, how easily it can be administered in your plant, and at what low cost.

Bausch & Lomb Optical Co., 95207 Smith St., Rochester 2, N. Y.

Please send me the brochure "Eyes Right for the Job," and complete details on the Bausch & Lomb Occupational Vision Service.

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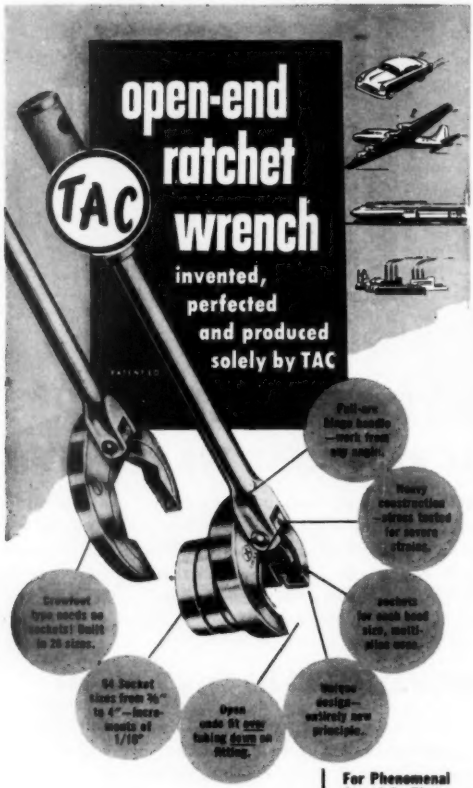
City ..... Zone ..... State .....

open-end ratchet wrench

TAC

invented, perfected and produced solely by TAC



Volume-manufactured in two styles—the socket type and the Crowfoot type, TAC Open End Ratchet Wrenches are scoring phenomenal time and labor savings throughout all Industry.

It is a matter of record that heretofore no tool was made that could — *in a limit of 7° ratcheting arc* — successfully tighten or back off nuts or fittings on tubing or other standing center assemblies. The speed with which TAC can complete difficult wrenching jobs, in anybody's hands, is amazing.

Our plants are currently producing at capacity for all the Armed Forces and for Defense industries.

For Phenomenal Speed in These Wrenching Jobs

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WATER AND GAS LINES
... AND DOZENS OF OTHERS

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TAC

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Look at these FEATURES:

- Posture back rests, interchangeable and adjustable
- Spring steel back bars for proper posture
- Seats dished for comfort, plain or Presdwood-covered
- Angle braces and angle legs for strength and rigidity

designed for comfort while working

This and other HALLOWELL Posture Stools and Chairs are described in Bulletin 704. Write for your copy. STANDARD PRESSED STEEL CO., Jenkintown 11, Pennsylvania.

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NO OTHER *Electric* HAND SAW Does . . . So Much So Fast . . . So Well

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SAWS

- 2" Hard or Soft Wood
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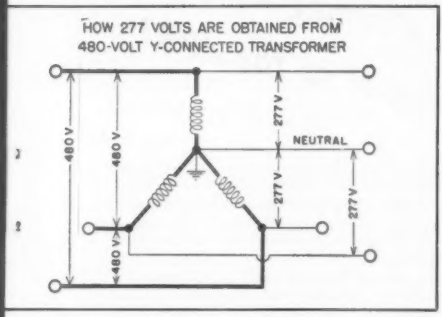
Cut Copper Requirements with 277-volt lighting

for factory office areas . . . office buildings

With the 277-volt lighting system, you use fluorescent fixtures with standard lamps and 240-280-volt ballasts.



Voltage between line and ground is 277 in standard 480-volt, 3-phase, 4-wire system.

Two important ideas in wiring now offer extra savings in copper for high-intensity lighting systems.

These two ideas (1) the G-E remote-control wiring system and (2) 277-volt fluorescent lighting can actually help you reduce the copper requirement for a given lighting load or let you offer extra lighting with a given amount of copper—and here's how:

277-volt Wiring System

By using 480Y/277-volt distribution for lighting, you get the copper-saving advantages of higher-voltage, lower-current distribution. This voltage is provided by the standard 480-volt, 3-phase, 4-wire system, which offers a line-to-ground voltage of 277. Standard fluorescent fixtures with 280-volt ballasts can be connected directly into this system with no extra preparation.

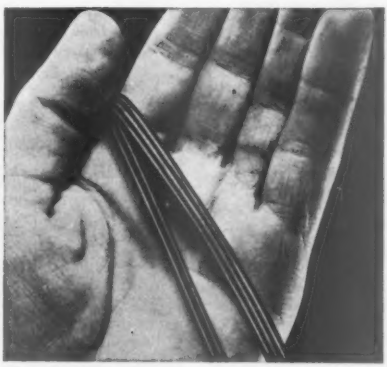
G-E Remote-Control Wiring

Master selector switch RMS-2 and other components of the G-E remote-control wiring system offer convenient switching of as many as nine circuits, save copper by using small 24-volt control wires. Remote-control relay RR-2 mounts in knock-out box or ganged in pull box near lighting fixture—switches can be installed at any convenient location.

Individual switches and master selector switches offer the advantages of multipoint switching—in spite of today's tight copper supply.

Investigate the 277-volt lighting system and G-E remote control. Write today for a copy of *G-E Remote-Control Manual of Layout and Installation*. Section D40-734, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

MASTER SELECTOR SWITCH permits flexible control of large areas of lighting from central locations—can be used for watchmen's circuits and standard lighting control.



ADDED COPPER SAVINGS are accomplished by this small, lightweight control wire used with the G-E remote-control wiring system. Wires can be laid up on partitions, can be rerouted easily at any time.

REMOTE-CONTROL RELAY operates on 24 volts—cuts costs and copper required to run load lines down to switches. Rated ⅓ hp, 15 amp, 125 volts; 10 amp, 277 volts. No need for derating with fluorescent loads.

You can put your confidence in—

GENERAL ELECTRIC

NEW Amazingly Effective!

CROWN Rust Inhibitor

(Pat. Pending)

Spray or DIP

ONE Application Stops Rust for Months*...Retards Rust Already Started....

CROWN Rust Inhibitor is a new and remarkable preventive proved in both shop use and by laboratory tests. Effective against rust caused by humidity, moist hands—even salt spray! . . . *Just put it on and leave it on.* Not a messy, smeary oil or hard drying film. Harmless to hands, metal, plastics. Highest quality animal wax base will not gum or clog under heat or friction. Can be used on damp metal. Protects during storage or shipment. Need not be removed from tools or equipment before using. Resists rubbing off, but can be removed easily with gasoline or kerosene . . . In aerosol-type can for handy spray application—or apply by dipping.

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- FOR ANYTHING THAT'S VALUABLE AND SUBJECT TO RUST!

*Indoors—in average conditions

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Discount for cases of 12. Also in bulk; write for details and discount

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Take a look at your own cleaning program! Are you trying to do a 1952 cleaning job with 1908 model equipment?

Modern, cost-reducing cleaning methods call for modern equipment. And, that's where Tornado cleaning is proving itself in thousands of plants, institutions and commercial buildings.

The powerful, rugged Tornado sucks air in excess of 300 m.p.h.—picks up scrubbing solutions and liquids just as easily as dirt and metal chips.

You'll find Tornado always equal to your cleaning work whether it be regular wet or dry floor cleaning, overhead work in hard to reach spots, cleaning lint from electric motors and equipment or blowing dirt and debris from aisles and under stationary seats and equipment. Write for bulletin 600.

From liquids to metal chips, Tornado pickup gets them all!

The removable blower cleans machinery and motors.

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...not Footage

The True Yardstick of Air Hose Value

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Experience tells you that the hose which is built with an *extra* measure of strength, flexibility, damage resistance and safety is surely your soundest investment.

This is true of *every* BWH Air Hose. Each has been specifically developed, tested and field-proven to give maximum long, trouble-free life in its job.

Get in touch with your BWH distributor — *today.*

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Distributors in all Principal Cities

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CONCORD AIR — An extra quality, exceptionally rugged hose for toughest use on air drill and pneumatic service in mines, quarries and construction jobs. Non-porous tube resists heat and oil. High tensile cotton yarn braid reinforced carcass. Tough grey cover resists cutting, gouging, abrasion. 7 sizes from ½" 2-braid through 2" 3-braid. 200 to 300 lbs. working pressure. Maximum length 50'.

BAY STATE AIR DRILL — For heavy construction work in mines, quarries, tunnels and wherever large size hose is required for long service. Smooth black tube resists heat and oil. Carcass of strong, rubber-impregnated multiple ply woven duck. Rugged, heavy-gauge red rubber cover resists severe weather extremes, cutting, abrasion. 9 sizes stocked from ½" to 4". Working pressures from 150 to 225 lbs. Max. length 50'.

AUROCHS AIR — For portable air compressors, jackhammers, rugged industrial and construction work. Smooth, black, non-porous tube resists heat and oil. Carcass: multiple ply, rubber-impregnated, rugged woven fabric. Tough black cover resists weather and abrasion. Stocked sizes: ½", ¾", 1". 200 lbs. working pressure. Maximum length 50'.

VIM AIR — For general industrial use, on compressors and pneumatic tools. Black tube resists oil and heat. Husky cotton yarn braids. Smooth, red cover resists weather, abrasion. 8 sizes stocked, ¼" 2-braid to 1" 3-braid. Working pressures: 150 to 225 lbs. Maximum length 500'.

BULL DOG VARI-PURPOSE AIR — For a variety of jobs including handling of air, water, oil, gasoline, kerosene (not for paints, lacquers, lacquer-solvents). Black, synthetic tube resists oil and heat. Carcass is braided rayon cord, high strength, super flexible. Smooth, brown, tough synthetic cover resists oil, abrasion, sunlight. 11 sizes stocked from 3/16" one-braid to 1" 2-braid. Working pressures: 200 to 300 lbs. Maximum length approximately 500'.

● Here is the latest development in a time-saving, money-saving industrial cleaner—Holcomb "*Floats-Off*." This speedy synthetic detergent removes all types of dirt . . . does away with scrubbing . . . cleans faster.

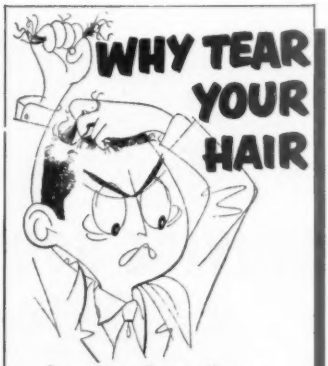
Floats-Off contains a powerful cleaning booster that loosens, lifts, floats off the dirt. Just mop it on and rinse it off—your surface is shining clean.

There's no soap to leave a film—no acids or alkalies to harm your hands or surfaces. It's highly concentrated to save you storage space, time and money. A little goes a long way—does a lot of work.

Like all Holcomb products *Floats-Off* is built to reduce your cleaning costs—to do a better job in less time. That means *dollar profit* for you! And for every cleaning need, call a cleaning engineer—your nearby Holcomb serviceman.

Research Laboratory and Factory: 1601 Barth Ave., Indianapolis, Ind.
Branches: New York 18 and Los Angeles 21

J. I. HOLCOMB
MANUFACTURING COMPANY
Scientific cleaning materials since 1896



In spite of vacation slow-downs—

You can count on Emery's AIR PROCUREMENT SERVICE to get your air shipments to you from any point in the Nation faster and more dependably. Just a simple 'phone call does it—24 hours a day—Sundays and Holidays, too!

EMERY AIR FREIGHT CORPORATION
Offices in all principal cities in the U. S.
Consult your 'phone book

for dependable sound, INDUSTRY relies on

ATLAS

DR Double Reentrant Projectors

Paging & Talk-Back Speakers

DEPENDABLE QUALITY: The latest electro-acoustic research and engineering—and over 20 years of manufacturing know-how—are behind every ATLAS product.

Dual Speakers

DEPENDABLE SERVICE: Coast-to-coast and around the world today—in every Industrial, Marine, Railroad, Military, Educational, Civic, U.S. and Foreign Government application—under every kind of climate and noise condition—ATLAS sound equipment is famous for highest efficiency and durability. That's the proof of ATLAS performance dependability.

JUDGE for yourself, COMPARE ATLAS at your local Jobber today. See why ATLAS is the preferred line for utmost dependability. Write NOW for FREE latest Catalog 551.

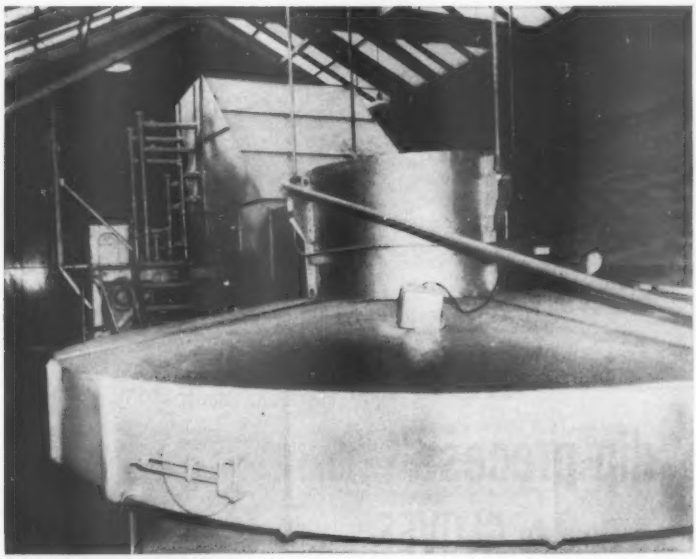
ATLAS SOUND CORP.
1452-39th Street, Brooklyn 18, N. Y.
In Canada: Atlas Radio Corp., Ltd., Toronto, Ont.

ALL but 2% of Moisture Extracted

from Various Milk Products

by AUTOMATICALLY-CONTROLLED GAS DRYER

at DEAN MILK COMPANY



20′ diameter stainless steel dryer for powdered milk production, with Gas-fired Air Heater in the background. In the round portion is located the nozzle from which fluid milk is sprayed into the hot air stream under high pressure.

POWDERED MILK another of the long list of important food products processed in Gas-fired Equipment, requires precise control of temperature and volume of heated air to dehydrate fluid milk. In a pilot plant, which also utilized GAS for heat processing, Dean Milk Company engineers developed the method of atomizing milk at high-pressure into a turbulent stream of heated air.

The success of the pilot plant guided these engineers in the construction of a Gas-fired Extractor which delivers powdered milk, ready for packaging, with 2% or less residual moisture.

Because powdered milk must meet the same sanitation standards which health authorities have set up for fluid milk Dean Milk Company observes the strictest standards of quality control and cleanliness. The use of GAS, with its precise controllability and inherent cleanliness, aids in both of these—and in reducing the complexity and costliness of equipment, as well.

The scope of GAS applications for food processing is so broad that you will find it worthwhile to examine your present and future needs for fuel in any types of operation—ask your Gas Company Representative for assistance.

AMERICAN GAS ASSOCIATION • 420 LEXINGTON AVE., NEW YORK 17, N. Y.

Lower the Boom

.....or raise it!

THE BUSCHMAN TROJAN with one man "finger" control

"Safety balanced" boom makes this possible. Yes, and one man can quickly move the TROJAN on the easy-rolling, anti-friction-bearing wheels. Use this all-purpose powered conveyor for loading, unloading, stacking or boosting. Operates in both directions; available for single or 3-phase application; and it performs faithfully under all conditions, year in and year out.

Ask for Bulletin 50-A

PRODUCE MORE ... FOR LESS on Buschman Conveyors

THE E. W. BUSCHMAN CO.
4425 CLIFTON AVENUE
CINCINNATI 32, OHIO

Representatives in Principal Cities
Canadian Licensee: James A. McKechnie
Toronto 12, Canada

HOOD "dip process"

assures safer, more flexible GLOVES

Hood's scientific "dip process" precisely controls the amount and viscosity of latex coating on each glove—assures the proper thickness and flexibility needed to make each glove most efficient for the type of work for which it's intended.

Hood's experience, equipment, electronic control and "on the job testing" result in uniform and safer industrial gloves.

Hood makes a complete line of industrial rubber gloves to meet every job requirement. Write today for colorful catalog featuring the Hood Glove Guide which shows you "how to choose the RIGHT Glove for EACH job."

hands are vital..protect them with HOOD GLOVES

HOOD RUBBER CO., Watertown, Mass.

Engineers, product designers and metallurgists are at work in many industrial fields, determining how and where they can use the spectacular wearproofing properties of Grade 608, first in the new series of Carboloy Cemented Chrome Carbides. (Sample kits of test parts, shown here in actual size, are available for $10.75.)

Industry now testing new cemented chrome carbide for corrosion, abrasion, erosion

Starting *right now!* Here's the story of another new Carboloy created-metal born to succeed.

It's the story of the new Series 600 Carboloy Cemented Chrome Carbide, containing chromium as the principal ingredient and developed specially for high resistance to corrosion or erosion combined with good abrasion resistance. Grade 608, the first in this new series of chrome carbides (now available in test-sample quantities), promises famous carbide wearproofing benefits for whole new fields of industry.

Lightweight, nonmagnetic, with a coefficient of thermal expansion about the same as steel, Grade 608 chrome carbide is machineable, hard as tungsten carbide, and stable and strong. Field tests indicate Grade 608 is highly satisfactory for gages, and will probably be equally satisfactory for nozzles for fats, oils and acids; and for centrifuge blades and similar cost-cutting, production-boosting, wear-resistant applications.

MASTERS IN METALS

Carboloy Cemented Chrome Carbide is just one of the Carboloy created-metals that help create better products.

Perhaps there is a Carboloy metal with its wide range of advantages that you can use. Carboloy Cemented Tungsten Carbide for more efficient cutting tools, dies, or wear resistance, for example. Or Carboloy Alnico permanent magnets to incorporate in a product and improve its design, lower its cost.

Or Hevimet for a better balance weight or radioactive radiation screening.

Then get in touch with a Carboloy engineer for the latest application techniques and all the practical knowledge available on these created-metals.

And look to Carboloy metallurgists, too, for continued pioneering in even broader fields of use for these and other created-metals.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company.

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11135 E. 8 Mile Road, Detroit 32, Michigan

Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, New York

CARBOLOY CREATED-METALS

ALNICO PERMANENT MAGNETS for lasting magnetic energy

CEMENTED CARBIDES for phenomenal cutting, forming, wear resistance, including

CHROME CARBIDES for exceptional resistance to abrasion with erosion or corrosion

HEVIMET for maximum weight in minimum space, and for radioactive screening

FIRST IN MAN-MADE METALS FOR BETTER PRODUCTS

Where can YOU use CARBOLOY CEMENTED CHROME CARBIDE?

Carboloy Chrome Carbide gives high resistance to corrosion or erosion, combined with good abrasion resistance. And chances are, *within your operations*, there will be applications where this new Carboloy created-metal will improve product design . . . boost production efficiency . . . or lower manufacturing costs. Consider the following chrome carbide facts in the light of *your* product . . . and *your* production methods:

PHYSICAL PROPERTIES

(Grade 608)

Composition: 83% Cr_3C_2
2% WC
15% Ni

Hardness (Nominal): 88 Rockwell "A"

Density (Nominal): 7.0 gms/cm³ (Slightly lighter than S.A.E. 1095 steel)

Transverse Rupture Strength: 100,000 P.S.I.

Coefficient of Thermal Expansion:
6.4 in range of 70°—1292°F.

Relative Abrasion Resistance:
Dry Al Oxide—58.0

TYPICAL TEST RESULTS

SALT SPRAY: After subjection to a 30% salt spray for 750 hours, Grade 608 still retained its metallic lustre. **SULPHURIC ACID:** With sulphuric acid as the corrosive agent, Grade 608 showed about 30 times the resistance of 18-8 stainless steel, and 3 times the resistance of tungsten carbide. **NITRIC ACID:** Using nitric acid, the resistance to corrosion was approximately 8 times that of other carbides and twice that of stainless steel. **STEAM EROSION:** Tests indicate a resistance to steam erosion approximately 60 times that of conventional carbides. **LACTIC OR CITRIC ACID:** Grade 608 was practically inert under all conditions when exposed to lactic or citric acid. **OXIDATION RESISTANCE:** Grade 608 appears to be virtually completely resistant to oxidation at all temperatures up to 1000°C. (1832°F.).

SUGGESTED USES

The following applications are suggested for Grade 608 Chrome Carbide. (Where else can you see use possibilities?)

- Sheer blades for molten glass
- Core pins for baking ceramic parts
- Fishing rod guides
- Centrifuge nozzles, separating equipment
- Bearings where corrosives are present
- Textile guides
- Nozzles and valves: soaps, fats, oils, foods, chemicals, petroleum products, pharmaceuticals, fruit juices
- Valve and core pins, die casting
- Punches for movie film
- For many applications where stainless steel is not sufficiently abrasion-resistant

SEND FOR YOUR TEST KIT TODAY!

Why not explore all the possible, profitable uses for Carboloy Chrome Carbide within your operations? Send today for test kit (shown at left) of sample parts of Carboloy Chrome Carbide ($10.75). Samples are adequate for a wide range of your initial metallurgical and engineering tests. Or, write for free Carboloy Chrome Carbide Bulletin WR-104.

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11135 East 8 Mile Road, Detroit 32, Michigan

GUARD FOOD SERVICE COSTS WITH TOLEDO KITCHEN MACHINES!

CONVEYOR DISHWASHERS

DOOR-TYPE DISHWASHERS

PEELERS

The same Toledo Scale precision that keeps tabs on materials throughout industrial production—today helps attain top efficiency in restaurant kitchens everywhere. Toledo Dishwashers and Food Machines of modern design and outstanding performance are available in wide range of types and capacities for all restaurant, institutional and in-plant food serving requirements. Send for new bulletin KM7 on Guarding Food Service Costs. Toledo Scale Company, Toledo 1, Ohio.

CHOPPERS

SLICERS

STEAK MACHINES

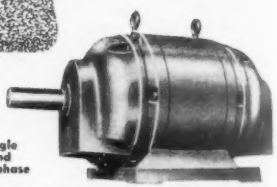
TOLEDO®

Headquarters for SCALES and Restaurant KITCHEN MACHINES

SAWS

RECEIVING SCALES

CUSTOM-BUILT—
NOT CUSTOM PRICED



Single and Polyphase

Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

Write for Complete Details Today

VALLEY
ELECTRIC CORPORATION
4221 FOREST PARK BLVD. · ST. LOUIS 8, MO.

EXTENSIVE COMPACTING and TROWELING

makes

Kalman

"ABSORPTION PROCESS"

CONCRETE FLOORS

- TOUGHER
- UNIFORMLY HARDER
- LONGER-LASTING

Kalman has the method, the national organization and 36 years of "know-how" to put down a superior, longer-lasting concrete floor. For heavy duty, low maintenance floors, investigate the Kalman Process.

WRITE FOR FREE BOOKLET!

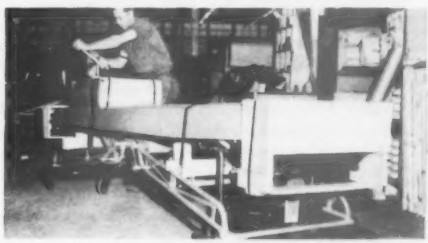
KALMAN FLOOR CO., INC.
110 East 42nd Street, New York 17, N. Y.
Boston · Charlotte · Chicago · Cleveland · Dayton · Detroit
Houston · Los Angeles · Philadelphia · San Francisco

Acme Steel Strapping Insures S.A. *(Safe Arrival)*

Saves time, money, materials, too!

ARMY RATIONS REACH KOREA. South Korean longshoremen at Pusan unload cartons protected by steel strapping. Government specifications require this protection for all boxes bound for overseas. Goods arrive safe and sound despite countless handlings from manufacturer to depot to base.

TIES UP TIES. The Southern Railway scooped up 180,000 ties from an unused stretch of track, tied them in convenient bundles with Acme Steel strapping for easy loading, shipping, tallying and storing.

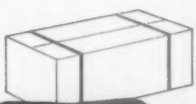


STRAPPING A RAPISTAN! The Rapids-Standard Company makes a variety of sizes, types and models of power conveyors, odd shapes to pack and ship. They do it quickly, easily, safely with framing and corrugated board held by Acme Steel Strapping.

The things you eat and wear and read and sit on seldom reach your house still protected by Acme Steel strapping. But somewhere along the line steel strapping protects all or part of almost everything you use.

Acme Steel strapping insures safe arrival. That's what it's made for.

Acme Steel strapping also reduces packing and shipping costs. We have many striking examples of this. Write for them to Acme Steel Products Division, Dept. FM&M-72.

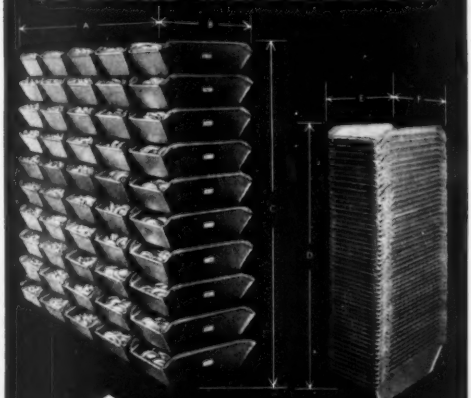


ACME STEEL

ACME STEEL COMPANY

2849 Archer Avenue, Chicago 8, Illinois

WHAT DOES IT COST YOU TO STORE NOTHING?



Stop and think—your present materials handling boxes take up just as much precious floor space empty as they do filled. But not Nestiers. The new modern Nestiers *nest* to save space!

Check the space requirements in the illustration above and then compare them with the space you now devote to the same number of filled and empty boxes. For a comparison of larger quantities, 500 No. 175 Nestiers, nested in stacks of 50, take up 13.1 sq. ft. of floor space—1,000 Nestiers in stacks of the same size use only 26.2 sq. ft. of space! Figure the big amount of space you can save with Nestiers—and remember, it's a lot cheaper to conserve the space you have than to expand it.

Nestier	A	B	C	D	E	F
#220	67½"	22¾"	67¼"	51½"	22¾"	13½"
#175	51¼"	18¼"	56½"	55"	18¼"	10¼"

Write for this brochure describing the Nestier and the Nestier System. You'll see that the space saving feature is just one of many advantages of this revolutionary materials handling box.

NESTIER
IT NESTS • IT TIERS

THE CHAS. WM. DOEPKE MFG. CO., Inc.
Metal Specialties Division Rossmoyne, Ohio

FARADAY FIRE ALARMS

WHETHER the "fire" problem is minor or major, your primary concern is to make sure the system is "foolproof". Faraday stations, control panels, complete systems are known throughout the industry for their dependability. Protect with the best—Faraday.

FARADAY BELLS

The "electrical nerve network" that keeps big or little plants going must be better than average. Years of experience, design, know-how have made Faraday visual and audible signaling devices the outstanding brand. Illustrated Model ATL-700 Vibrating Bell is one of the many in-plant units planned for better department coordination. Buy Faraday—they're dependable.

FARADAY

THE EMBLEM
OF SIGNAL SERVICE SINCE 1875

FARADAY SIGNALS AND SIGNALING SYSTEMS ARE ENGINEERED AND BUILT FOR THE HIGHEST STANDARDS IN PERFORMANCE AND DEPENDABILITY.

HOLTZER-CABOT **FARADAY** STANLEY & PATTERSON

CONSOLIDATED BY:

Sprott Faraday Inc.

ADRIAN, MICHIGAN

BELLS • BUZZERS • HORNS • CHIMES • VISUAL AND AUDIBLE PAGING DEVICES AND SYSTEMS

MAGNESIUM

fastest machining of all structural metals!

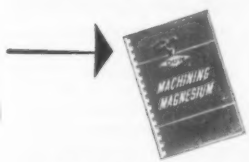
Magnesium parts can be machined at higher speeds and feeds than any other structural metal. This has proved an influencing factor in its use, even where weight saving is not of primary importance and the cost of the magnesium part is higher than the competitive material *before either is machined.* With power consumption as a basis of machinability comparison, magnesium requires only one-half to two-thirds the power required for brass or aluminum, one-third that for cast iron, and one-sixth that for steel. In one case a switch to magnesium from cast iron for pulleys resulted in a saving of 45 minutes per part. It has also been observed that cutting tools last from 3 to 10 times longer when machining magnesium than when machining aluminum under similar conditions. In addition, excellent surface finishes have been obtained because there is no metal drag or tear.

Dow has over 30 years experience in magnesium—a call to your nearest Dow sales office will put this knowledge at your disposal.

THE DOW CHEMICAL COMPANY

Magnesium Department • Midland, Michigan

New York • Boston • Philadelphia • Atlanta • Cleveland • Detroit
Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada



Write for free book on your company letterhead

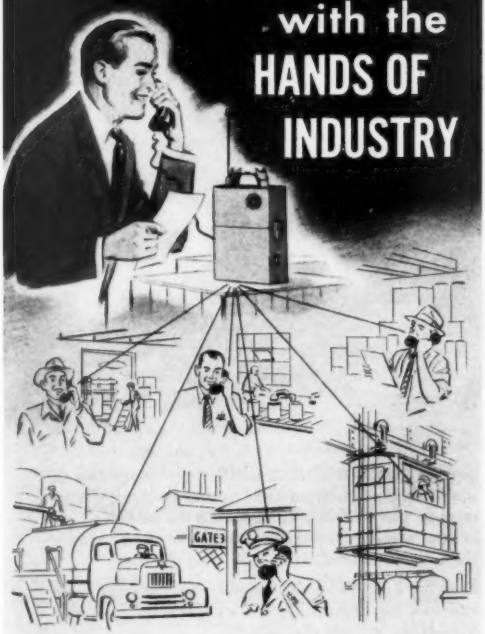
MACHINING MAGNESIUM

It contains the latest information covering all phases of machining magnesium.

Hallicrafters

littlefone.

LINKS THE BRAINS with the HANDS OF INDUSTRY



Speed production, cut costs, improve the product, increase safety—these are measurable benefits of the Littlefone! Only 9½ to 14 pounds in weight, these portable 2-way FM radiophones can be a "miniature radio network" linking all your key men—on the move or at a desk. It has solved production bottlenecks in hundreds of industries and businesses. Write today for specifications.

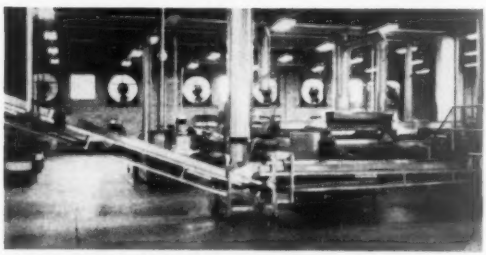
Hallicrafters
DEPARTMENT L-FM, CHICAGO 24
WORLD'S LEADING MANUFACTURER OF
PRECISION RADIO & TELEVISION

When It's HOT

Don't Be Wishing You Had Bought

Still Time to Enjoy Cool Working Conditions *this summer*

Simplicity of installation eliminates long delays . . . puts Coolair Breeze Conditioning to work cooling your plant or factory within few days. First cost is low. Installation at a minimum. Operation and upkeep negligible. No water required! Brings the breeze inside.



Production in this food plant never sags in hot weather! Coolair Breeze Conditioning sweeps entire plant with cooling breezes—improves morale, production.

The complete line of Coolair Breeze Conditioning Fans includes mouse-quiet, spring-mounted models for cooling homes, offices, schools, churches.

Low-Cost Cooling? You'll be surprised how little Coolair Breeze Conditioning costs! Write TODAY for complete information and the name of your local Coolair representative. American Coolair Corporation, Jacksonville 3, Florida.

QUICK-MAKE, QUICK-BREAK PLUG-IN BREAKER—Trumbull's new NLTQ Panelboard introduces the first *plug-in* circuit breaker with quick-make, quick-break operation. Other features: both *thermal* and *magnetic* protection . . . trip-free . . . pressure-type silver-plated copper plug-in contacts . . . all ratings physically interchangeable. Adjacent breakers are on alternate phases—assuring balanced loads and circuits.

New insulating material

KEEPS PANELBOARDS COOLER

The base of this panelboard interior is made of *Plastisol* . . . the first time this amazing plastic material has been used for this purpose.

Here are some of the properties which make Trumbull's new NLTQ Panelboard a superior product which will give you excellent service.

Plastisol has very high thermal conductivity and is an excellent radiator of heat. Copper bus bars encased in Plastisol run 10% cooler than in open air!

SUPERIOR TO ALL OTHER TYPES OF INSULATION

Other Plastisol advantages making it superior to all other types of insulation for this purpose include its ability to resist acid and alkali, high temperatures (not harmed at 212 F), tracking and carbonizing. It will not shrink or become brittle, even at minus 30 F.

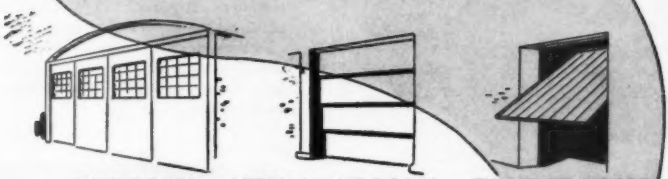
Trumbull's Plastisol base is Underwriters' Laboratories, Inc. approved and endorsed by the Electrical Council.

QUICK INSTALLATION—NO NUTS AND WASHERS—Interior is mounted in box by compression springs . . . which permit easy release for removal. Springs also permit lining up fronts regardless of uneven box installation. Trumbull NLTQ panelboards with lug or circuit breaker mains come in capacities up to 225 amperes in a range of 4 to 42 circuits. Write for Bulletin TEB-14.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

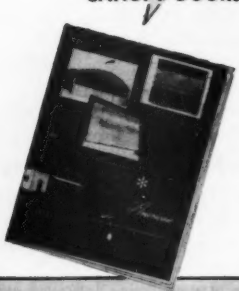
any SIZE . . .
any TYPE . . .
to meet your needs



SLIDE DOORS VERTICAL-LIFT DOORS TURNOVER DOORS

CANOPY DOORS

● Do you have a problem which involves doors? Tell us about it. We have tackled a wide variety of puzzling requirements. We have produced answers when others have been unable to offer solutions. A long list of satisfied customers is your assurance of our ability to solve tough problems . . . and to meet tight budgets! Put us to the test.



Write for new free Industrial Door Guide to the latest and best in industrial doors

INTERNATIONAL STEEL CO.
1905 EDGAR STREET • EVANSVILLE 7, INDIANA

BLOW WHISTLES
RING BELLS automatically

Montgomery

PROGRAM CLOCKS and INDUSTRIAL TIMERS

PAYS FOR ITSELF quickly — by controlling accurately all working schedules. Install for less than $100.00. Make your manual system automatic, replace unreliable program clock, install new system.

MONTGOMERY MANUFACTURING CO.
Owensville 10, Indiana

Open time available on new Fellows 7125A Gear Shaper for precision gear cutting, 96 pitch and courser.

His business paper . . . of course

No man who takes his job seriously takes his business paper lightly. The **Best Informed Men in your Field** read every issue . . . straight through. They can't afford not to. Matter of fact, who can? You *need* the continuous touch with facts, news and "how-to" that only your business paper provides. Cover-to-cover reading makes *you* one of the **Best Informed Men in your field,** too.

FACTORY MANAGEMENT & MAINTENANCE

One of a series of ads prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

There Ought to be a LAW...

and there IS!

Over the years eye injury costs at your plant will follow the LAW OF AVERAGES unless an adequate eye protection program is installed.

Eye injuries cost industry more than $5 per employed worker per year with compensation averaging nearly $400* per injured man. (If *your* company's eye accident costs have been less, without a formal eye protection program, you have been fortunate —*so far.*) Eye accidents also cost $5 in lost productive time every second the clock ticks—time you, your customers and the nation can ill afford.

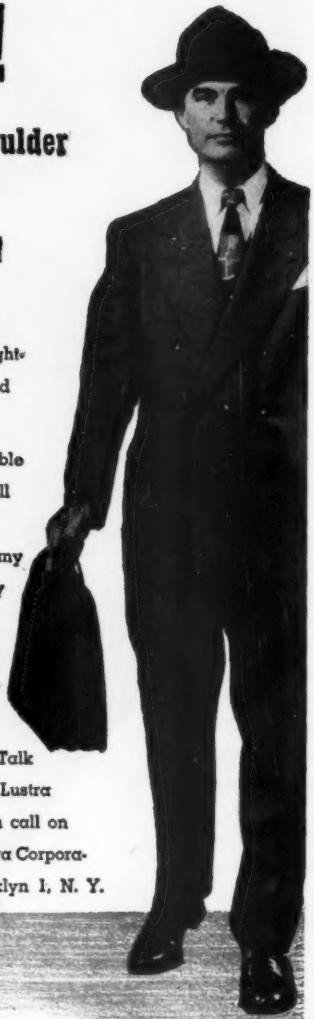
Put a comfortable AO Safety Goggle on every exposed worker and you *can prevent* 98% of these accidents at very little cost. Act *today*—it may be later than you think. Ask the AO Safety Products Representative in your area to call with facts and figures. Or write American Optical Company, 436 Vision Park, for free booklet "Improved Industrial Vision."

*Estimate

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

HE'S LOOKING FOR TROUBLE!

Your Lustra Man will shoulder your lighting problems... and save you money, too!



TODAY, over a hundred thousand stores, plants and institutions are getting better lighting at lower cost... because they've turned the job over to their Lustra Man.

This new way of buying lighting is available only through your local Lustra Man. You'll find him conscientious, capable and thoroughly qualified to solve practically any lighting problem with the complete quality line of Lustra Double Duty Lamps and Fluorescent Tubes. Lustra Lamps are premium-built for full light output throughout their extra long-burning lives.

Get the most for your lighting dollars. Talk over your lighting requirements with your Lustra Man. Simply write us and we'll have him call on you, or phone you for an appointment. Lustra Corporation, Dept. T-7, 36 Washington St., Brooklyn 1, N. Y.

Lustra

AMERICA'S DATED LAMPS

Double-Duty Reflector Lamps, Incandescent Lamps, Fluorescent Tubes, Spotlites and Floodlites, Rugged Duty Lamps, Fluorescent Fixtures and Starters.

LIKE AN ATOMIC EXPLOSION

Just 1/32" (pencil size) faucet leak
MUSHROOMS into ATOMIC WASTE
of approximately 93,000 gallons
of water yearly—costing:

$24.14

@ $1.00 per 1000 cubic feet

If a hot water faucet, (just (actual) FUEL WASTED heating 93,000 gallons costs approximately:

$88.91 if coal (2672 lbs.)
$91.08 if oil (792 gals.)
$84.41 if gas (84,414 cu. ft.)

Above figures authenticated by Hackensack Water Co. and American Gas Association.

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with "SEXAUER" "Easy-Tite" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of BLAZE fixtures.

PAT'D.
"EASY-TITE" FAUCET WASHERS

...a modern laboratory triumph, are compounded from du PONT NEOPRENE (tested up to 300° F.) instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day super-heating water systems—that formerly broke down washer's structure.

Built like a tire with fabric re-inforcement they resist the grinding, closing squeeze that SPLITS and MUSH ordinary washers out of shape... causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold FAUCETS—thus you slash water, fuel and labor costs.

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A postcard will bring him and your NEW Catalog promptly.

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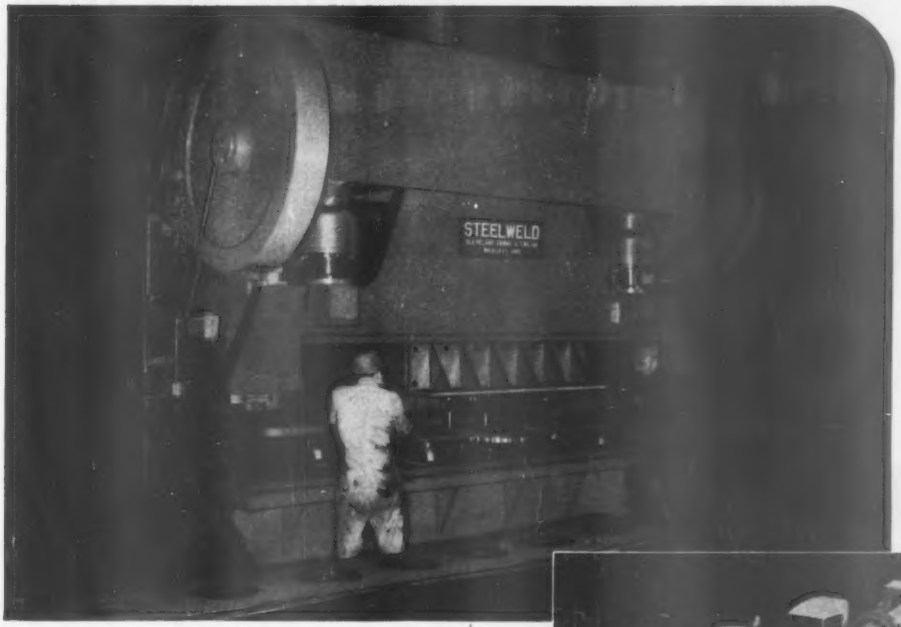
SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

Punches 15" Holes For Warner & Swasey Gradalls

Also Performs Bending and Flanging Operations

Flanging 15" diameter holes in outer boom plates of 3/16" steel. The holes were punched previously on this press.



Practically all of the steel plate on Warner & Swasey Gradalls, manufactured at their New Philadelphia, Ohio plant, is formed, punched and flanged on a Steelweld Press which is designed to brake steel plate up to 16' x ½".

One of the more interesting jobs done on this machine is the punching of 15" diameter holes in Gradall boom plates, followed by a flanging operation. Through use of special movable punches, many smaller holes of various sizes are made at a time, in locations as desired.

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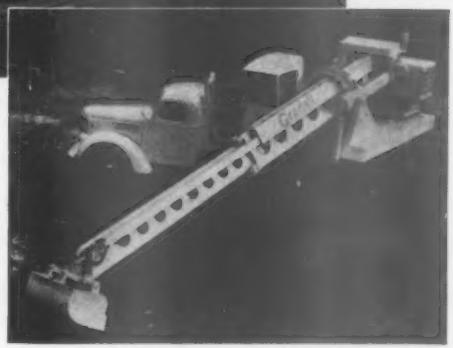

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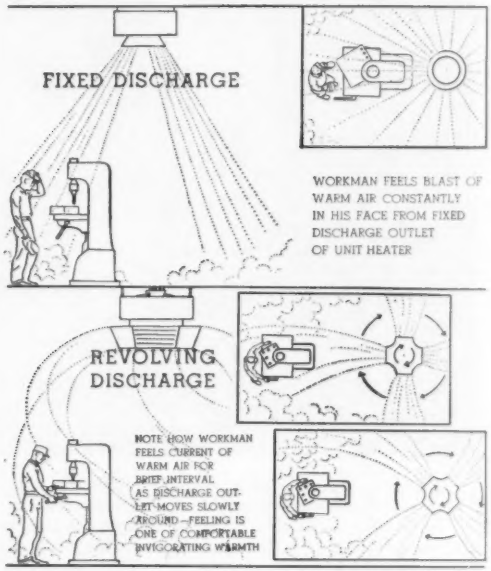
FIXED DISCHARGE
WORKMAN FEELS BLAST OF WARM AIR CONSTANTLY IN HIS FACE FROM FIXED DISCHARGE OUTLET OF UNIT HEATER
REVOLVING DISCHARGE
NOTE HOW WORKMAN FEELS CURRENT OF WARM AIR FOR BRIEF INTERVAL AS DISCHARGE OUTLET MOVES SLOWLY AROUND—FEELING IS ONE OF COMFORTABLE INVIGORATING WARMTH

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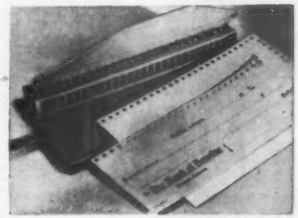
MISCELLANEOUS EQUIPMENT

Begins on page 194



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With this special hole punch, you can prepare your own files for edge-punched coding and sorting. The punch produces a series of holes along the edge of any card, form, or check.

By letting each hole represent certain information, you can then code each card or form by punching the necessary holes out to the edge. Then with the help of a sorting needle, you can select from your files all the forms containing a certain piece of information. Price: $32.50.

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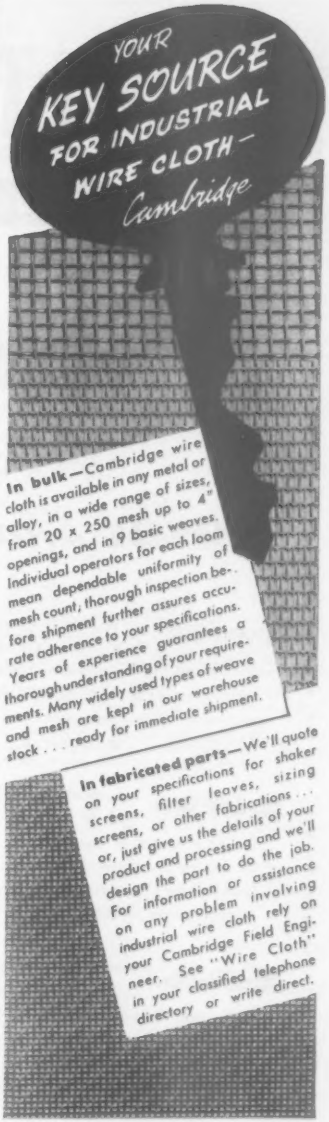

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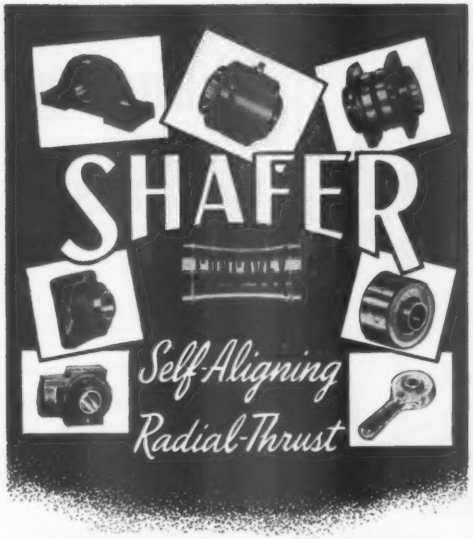

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These two compressors, installed in a machinery penthouse on the 11th floor of the Pathé Television Center, New York, are now mounted on Korfund standard steel spring vibro-isolators. The structural steel saddles shown are not ordinarily required, but were used in this case so that original piping could remain unchanged.

. . . by controlling vibration

When originally installed, each of these two big compressors was mounted on 4 rubber-in-shear rails, which were not the proper isolation for the vibration frequency and floor conditions.

Consequently, vibration transmission through these "mountings" was so bad that it was impossible to use office space on the floor below, and vibration and noise transmitted through the building were picked up on film sound tracks several floors down.

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This 80-foot Transite stack vents corrosive gases from a trunk sewer in a large city. In excellent condition after 14 years of service, it has already outlasted the original metal breechings.

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*Transite is a registered Johns-Manville trade mark

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(Continued on the following page)

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Additional Employment Advertising on pages 344 & 345

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E 259 Purchasing agent. Supervised procurement tooling program. Knowledge of radar equipment. Inventory control procedures, blue prints, etc. Purchases averaged $250,000 monthly in castings, steels, stampings, and electrical equipment. 13 years experience, age 43, salary open.

C 244 Administrative engineer, chief engineer, plant production and assistant works manager. Engineering sales. Willing to travel or relocate. 11 years experience. Age 32, $9000.

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POSITION VACANT

(Continued from Preceding Page)

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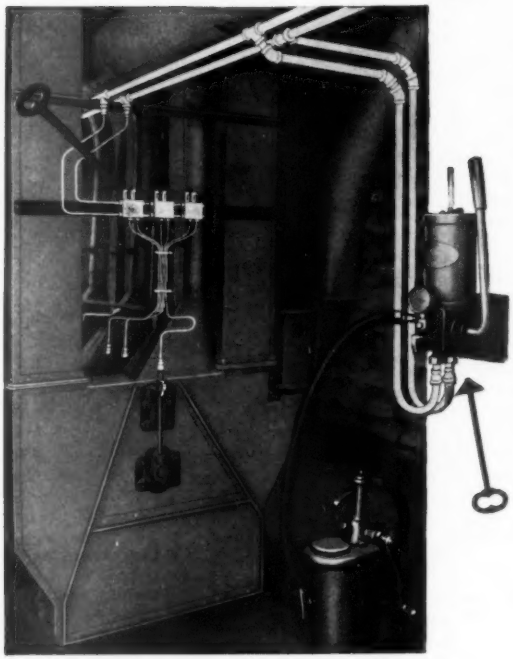

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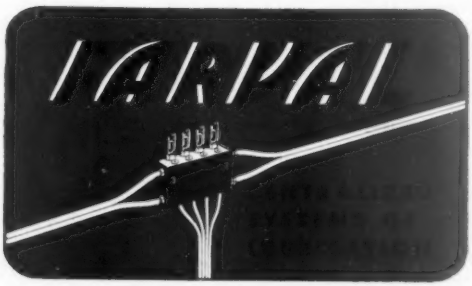

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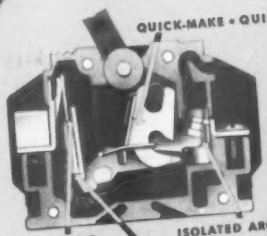

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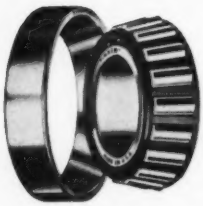

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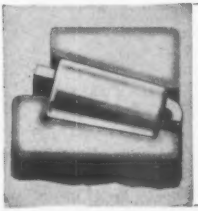

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